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A
TREATISE

ON
RETENTION OF URINE,

CAUSED BY
STRICTURES IN THE URETHRA;

AND

OF THE MEANS BY WHICH OBSTRUCTIONS OF THIS CANAL MAY BE
EFFECTUALLY REMOVED.

BY THEODORE DUCAMP,

DOCTOR OF MEDICINE OF THE FACULTY OF PARIS, MEMBER OF THE
SOCIETY OF MEDICINE OF THE SAME CITY, AND OF SEVERAL
LEARNED SOCIETIES.

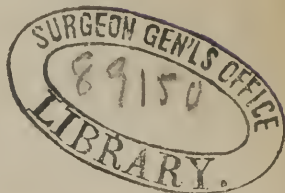
*TRANSLATED FROM THE FRENCH, WITH NOTES AND
ADDITIONS,*

BY
WILLIAM M. HERBERT, M.D.

NEW YORK:

PUBLISHED BY SAMUEL WOOD & SONS,
No. 261 Pearl-Street.

.....
1827.



SOUTHERN DISTRICT OF NEW YORK, ss.

BE IT REMEMBERED, That on the Fifth day of December, A. D. 1827, in the fifty-second year of the Independence of the United States of America, *William M. Herbert*, of the said District, hath deposited in this office, the title of a book, the right whereof he claims as proprietor, in the words following, to wit :

A TREATISE ON RETENTION OF URINE, caused by Strictures in the Urethra ; and of the means by which obstructions of this Canal may be Effectually Removed ; by **THEODORE DUCAMP**, Doctor of Medicine of the Faculty of Paris ; Member of the Society of Medicine of the same city, and of several learned societies. Translated from the French, with Notes and Additions, by **WM. M. HERBERT, M.D.**

In conformity to the Act of Congress of the United States, entitled, " An Act for the encouragement of Learning, by securing the copies of Maps, Charts, and Books, to the authors and proprietors of such copies, during the time therein mentioned." And also to an Act, entitled, " An Act, supplementary to an Act, entitled an Act for the encouragement of Learning, by securing the copies of Maps, Charts, and Books, to the authors and proprietors of such copies, during the times therein mentioned, and extending the benefits thereof to the arts of designing, engraving, and etching historical and other prints."

FRED. I. BETTS.

Clerk of the Southern District of New York.

WJ

D822t

1827

TO FRANCIS E. BERGER, M.D.

MEMBER OF THE FACULTY OF MEDICINE OF PARIS ;
FELLOW OF THE COLLEGE OF PHYSICIANS AND SURGEONS
IN THE CITY OF NEW YORK ; MEMBER OF THE PHYSICO-
MEDICAL SOCIETY OF NEW YORK, &c.

As a slight Testimonial of acknowledgment
for kind offices and valuable instruction, the
following work is respectfully inscribed,

By his Grateful Pupil,

Wm. M. HERBERT.

WT
D822t
1822

P R E F A C E.

MY object in composing this work has been to collect into one methodical synopsis, whatever is known concerning the retention of urine caused by a constriction of the urethra, and to supply the deficiencies which are observed in this branch of the healing art. After having thoroughly meditated on the various parts of my subject, I have freely expressed my sentiments on each of them. While rendering to celebrated men the homage of respect to which they are entitled, I have ever distinguished them from their doctrines; and, confining my attention exclusively to the latter, have, in my discussion of them, grounded my conclusions on facts, analogy, and argument. In a word, I have not, in the whole course of this work, offered an opinion without submitting to the reader the reasons which led to its adoption.

In the inquiry to which I have devoted myself, concerning the method of cure by which the dreadful malady described in this treatise may be most effectually combated, I have begun by establishing indications, which I have endeavoured to fulfil by the surest and readiest means. The different instruments employed by me are all of practical utility, as those physicians who may read this work with attention will easily perceive. They will see that the proper application of these instruments induces a permanent cure, and dissipates the dangers and uncertainty which attend the ordinary modes of treatment, which result only in a temporary alleviation.

I have described my instruments with the greatest care; not only to render their mechanism intelligible, but to afford directions for their fabrication, to those who may not have an opportunity to employ my workmen. To the description of these instruments are annexed the rules to be observed

in using them ; and any one, with the requisite knowledge, and a little dexterity, will easily understand and readily apply them.

Although experience might, in the course of my practice, have established the superiority of my method of cure, I have thought proper, before publishing it to the world, to submit it to the consideration of the most learned body in the kingdom. The distinguished individuals who were commissioned to report upon it, have neglected nothing which could illustrate that which had for its object the welfare of humanity. The report which they made, (I speak with heart-felt gratitude,) affords the highest encouragement I could have received, and, of all the rewards with which labour could be crowned, that of which I was most ambitious.

TRANSLATOR'S PREFACE.

THAT which is intrinsically valuable needs no recommendation. A useful book will find its way to the shelves of those most capable of appreciating it, without the introduction of an editor or translator. But, what is not always necessary, may be sometimes useful; and the approbation of competent judges, though it may not enhance the merits of a performance, must augment the respectability of its claims—to notice at least, if not to praise.

The Institute of France, the most illustrious association of learned men in Europe at the present day, appointed a committee to examine the work of M. Ducamp, and report upon its merits. This report, which is prefixed to the treatise, in the original, consists of a methodical analysis and examination, with comments upon the doctrines and inventions of the author. The following passage will show with what commendation the book was received by that body.

“The work of M. Ducamp leaves us now nothing to wish for; and, in this particular, we have no longer reason to be envious of our neighbours. Although of very moderate size, it is incomparably more complete and substantial than the bulky and voluminous books which have been for some time past published in foreign countries.”

It is much to be regretted that, notwithstanding the frequency and facility of our intercourse with foreign countries, an acquaintance with the changes and improvements which constantly take place in the various departments of science,

should often be limited, tardy, and imperfect. What agency national or traditional prejudice may have had in causing this deficiency, it is impossible to determine ; and it would be not only indecorous, but unjust, to attribute it to *a want of enterprise and due spirit of inquiry in the profession.*

To this source, however, whatever may be its origin, may be traced an erroneous opinion, prevalent to some extent in this country, respecting the mode of practice adopted in France, for the treatment of strictures in the urethra. Like most popular errors, it has had the support of authority : I allude to the manner of introducing the catheter.

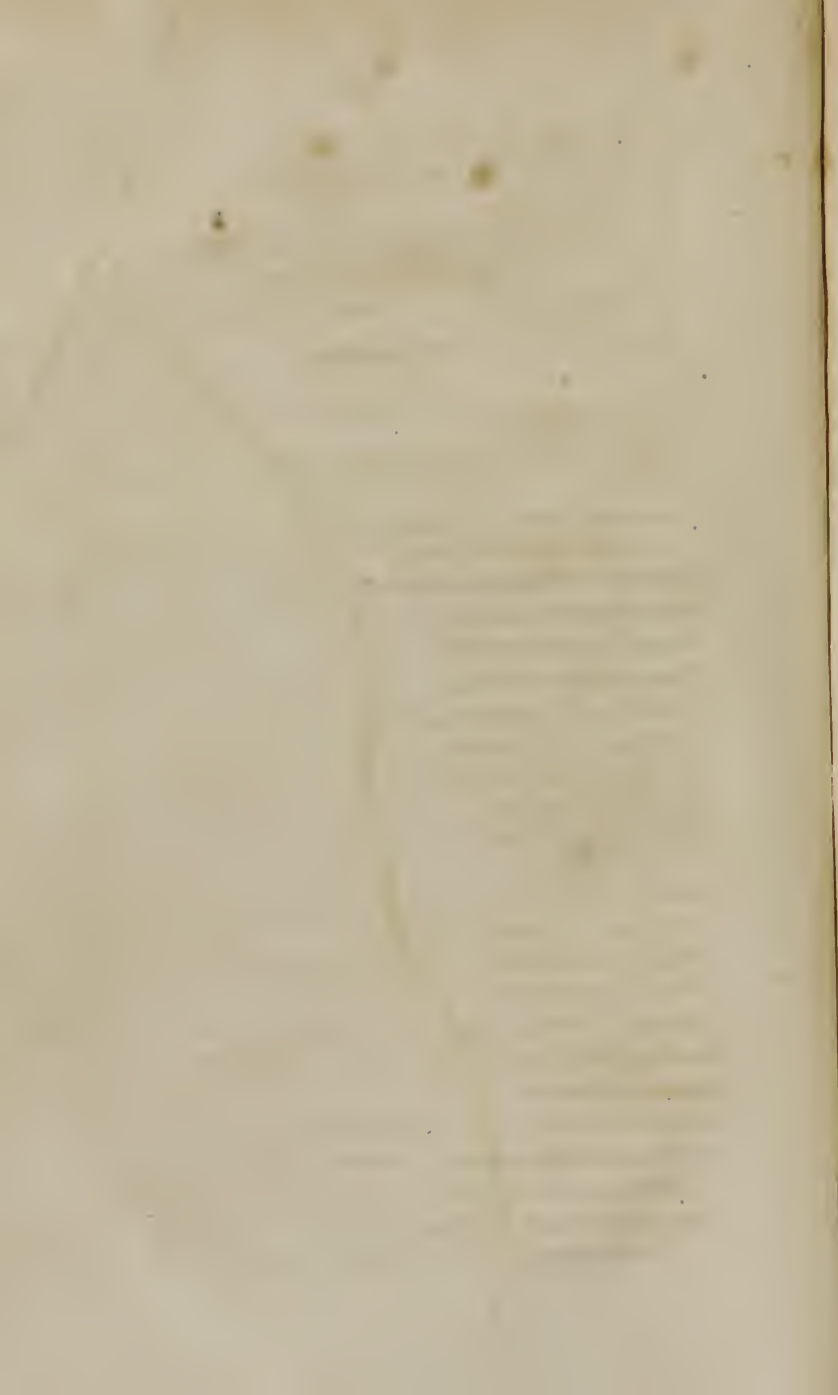
Desault, than whom few abler surgeons have adorned the profession, recommended the forcible introduction of the catheter in cases of complete retention, or where it was greatly to be apprehended. How far the propriety of this practice was called in question before the appearance of M. Ducamp's treatise, cannot easily be known ; but this author condemns it in the most decided and unequivocal terms.

" I repeat it again," says he, " and I believe it cannot be too often reiterated ; it cannot be otherwise than injurious, in the treatment of strictures in the urethra, to employ force for the introduction of instruments."

W. M. H.

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A TREATISE ON RETENTION OF URINE.

CHAPTER I.

DESCRIPTION OF THE DISEASE.

SECTION I.

Of the Urethra.

IT is impossible to study with advantage the diseases of the urethra, and their proper treatment, without a knowledge of the form and structure of this canal : some preliminary considerations, therefore, on this subject are indispensable : but it will be unnecessary to enter into anatomical details, which, as they are supposed to be familiar to the reader, would be here superfluous.

The urethra is an excretory duct designed for the emission of the urine and semen. It extends from the neck of the bladder to the orifice of the gland. Anatomists have divided it into three parts : that nearest the bladder has been denominated the prostate portion. It extends from twelve to fifteen lines in length. Its direction is oblique from above downwards, and from behind forwards. Its coats are thin, but the prostate gland embracing them closely, furnishes them with a thick and solid envelope. At the inferior part of this section of the urethra we observe an eminence of an oblong form, called the *veru montanum*, at the anterior and lateral parts of which open the seminal excretory ducts, and posteriorly those of the prostate gland.

The second division of the urethra has received the name of the *membranous* portion. Its direction is oblique like that of the preceding, and its length from nine to twelve lines. Its parietes are delicate and consist of two coats; the internal one, thin, elastic, and of a reddish hue, having all the characters of a mucous membrane; the external, more dense, firm, white, and extensible. The membranous portion of the urethra corresponds below and behind to the rectum with which it is connected by a quantity of cellular substance, and above and before to the inferior part of the symphysis pubis. The remainder of the urethra consists of a single division, called the spongy portion, and is one of the constituent parts of the penis. It is from six to seven inches in length; the upper part of its external surface is lodged in the groove formed by the corpora cavernosa, and the rest is covered by the common integuments. This portion of the urethra commences at an oblong pyriform expansion, and terminates at an other which constitutes the gland.

From the bulb to the gland the urethra presents an uniform cylindrical cavity; this becomes larger within the substance of the gland to form the fossa navicularis; this again grows much narrower and ends at the apex of the gland in an oblong aperture.

The spongy portion of the urethra consists of two membranes, the external of which is thick and cellular, and known by the name of the corpus spongiosum; the internal is a mucous membrane of great delicacy and tenuity, on the surface of which are numerous follicles which discharge a lubricating fluid.

The extent of the urethra is not the same in all persons, and writers on anatomy have manifested much diversity of opinion on this subject. In some works we find the urethra represented to extend from 10 to 12 inches

in length. This is an error, for it is rarely more than nine inches long, and very often less. Mr. Whately, in order to determine the point, measured the urethra of 48 subjects, whom he divides into three classes: the first of high, the second of middle, and the third of low stature.

The following is the result of his researches of persons of high stature.

					<i>Length of the urethra.</i>			
					In.	Lines.		
In	1	-	-	-	9	-	-	6
	8	-	-	-	9			
	5	-	-	-	8	-	-	6
	2	-	-	-	2			

Those of middle stature—

In	3	-	-	-	9			
	1	-	-	-	8	-	-	9
	7	-	-	-	8	-	-	6
	2	-	-	-	8	-	-	3
	7	-	-	-	8			
	2	-	-	-	7	-	-	9
	1	-	-	-	7	-	-	6

Those of low stature—

In	1	-	-	-	8	-	-	9
	2	-	-	-	8	-	-	6
	4	-	-	-	8			
	2	-	-	-	7	-	-	9*

These investigations prove the medium length of the canal to be between eight and nine inches.

The diameter of the canal is not uniform. Sir Everard Home has made very satisfactory experiments on this

* An improved Method of treating Strictures in the Urethra; by Thomas Whately, London, 1816. Octavo, pp. 68.

subject. He injected the urethra with melted wax, which when cool he removed from the surrounding soft parts, in such a manner as to obtain an exact impression of the canal.

The wax thus moulded measured as follows. [These experiments were made on the bodies of two persons, of whom one was between 70 and 80, and the other 30 years of age.]

	Subject of 80. Lines.	Subject of 30. Lines.
At the distance of 9 lines from the orifice	- 5	- $4\frac{1}{4}$
At 4 inches 3 lines	- - - - 4	- 4
$6\frac{1}{2}$ inches, at the bulb	- - - - 7	- $7\frac{1}{4}$
7 in. at the commencement of the memb. p.	4	- $2\frac{1}{4}$ *
7 in. 9 lines, near the prostate	- - - - 5	- 4
8 in. at the commencement of the prost. port.	4	- $3\frac{1}{2}$
8 in. 3 lines, at the centre of the p. p.	- - 6	- $5\frac{1}{2}$
$8\frac{1}{2}$ in. at the neck of the bladder	- - - 5	- $4\frac{1}{2}$ †

We find from these researches that the orifice of the urethra, which is from $2\frac{1}{2}$ to 3 lines in diameter, is narrower by one line than the rest of the canal, which in the greater part of its extent is 4 lines in diameter. The knowledge of these facts is important, because we can obtain a radical cure of strictures in the urethra only by restoring it to its natural calibre. Now if we compare the dimensions of bougies or catheters with those of the canal, we shall see that this result has never been attained; for the largest catheters in use, No. 12, are but three lines in diameter.

* There was a stricture at this point.

† Practical observations on the treatment of Strictures in the Urethra, by Everard Home. Third edition, octavo, 3 vols. London, 1805. Vol. I, p. 24.

SECTION II.

Of the Causes, Formation, and Symptoms of Strictures in the Urethra.

The discharge of urine from the bladder is impeded or rendered difficult by one of two causes: either, by a want of expulsive power in the reservoir, or by the obliteration, in a greater or less degree, of the channel through which it must pass. This obliteration sometimes exists at the neck of the bladder; it is then caused by the presence of a fungous tumour in this part, or by an enlargement of the prostate gland, varicose vessels, &c. This obstruction may be also caused by a calculus wedged in the urethra, but in a great majority of cases, in 9 out of 10 it is owing to a stricture in one or more parts of the canal.

Strictures in the urethra are always the product of inflammation,* and as gonorrhœa, is the most frequent as well as the most intense kind of inflammation to which the urethra is subject, so is it the principal cause of strictures in this canal. In fact, if we should carefully interrogate those afflicted with the latter disease, we would find that they had all experienced one or more attacks of gonorrhœa; that the attack preceding the stricture, had lasted a long time; that the disease had been renewed repeatedly; and, if closely pressed, they would generally give pretty nearly the following account of themselves.

“I had a great deal of trouble to stop the running of my last clap, although it was very small. My linen was constantly stained with little greenish spots. I had a sense of weight about the anus, and an itching along the

* See Note A.

canal. These symptoms grew worse on the least excess, whether of regimen or in venery, particularly the last, which always increased the discharge, and sometimes to such a degree that I thought I had caught another gonorrhœa. Sometimes all these symptoms would disappear, and I would imagine myself cured. But this would not last long. I also felt a slight scalding in making water, the stream gradually became smaller, less regular, &c."

If a bougie be passed into the urethra of a person labouring under these symptoms, the canal will be found extremely sensible throughout its whole extent, but remarkably so at one particular point. When the instrument touches this point, the patient complains of extreme pain, as if the canal had been perforated, and mechanically arrests the hand of the operator. If the latter persevere in his attempts, the pain increases, the bougie meets with resistance, and, if it be of considerable size, gets wedged in the part where the morbid sensibility is observed. When withdrawn the bougie is covered with mucus, and sometimes with blood; a small quantity of which also escapes from the orifice of the urethra. The painful point above-mentioned is the seat of chronic inflammation and incipient stricture.

In this state of things the inflammation has not yet indurated that part of the canal in which it is seated, so that its dilatation is easy; this has induced some English surgeons, and especially Charles Bell, to denominate these incomplete coarctations *dilatable strictures*.

The patient may remain in this state for a longer or shorter time, giving himself no uneasiness about his condition, and having no suspicion of the future sufferings which await him. If he seek advice, it will be rather for some increase of the discharge which causes him to apprehend another gonorrhœa; or perhaps for a swelling

of the testicle, to which the inflammation of the urethra may extend through the vesiculæ seminales and vasa deferentia. It will be fortunate for the patient if in such a case he address himself to a surgeon well versed in the knowledge of lesions of the urethra, and not to one of those who see but two things in diseases of the genital organs,—namely, syphilis, and mercury.

It is easy to explain in what manner long-continued inflammation may produce a stricture in the urethra. In the first place whenever inflammation passes from the acute to the chronic state, it diminishes in extent, and appears to concentrate itself in one particular point. This is what happens in the case under consideration. The morbidly sensible point is the seat of this inflammation. Now inflammation changes the nature of our parts, augments their sensibility and their volume; causes induration, adhesions, anomalous tissues, and ulcerations or greater or less extent,—all of which may happen in the urethra as well as any where else.

Induration. A constant effect of inflammation is a swelling of the part in which it is seated. This swelling is of two kinds; it is either owing entirely to the accumulation of the fluids in the vessels of the irritated organ, and disappears with the subsidence of that irritation; or it is the effect of a kind of hypertrophia, of an excessive, or morbid nutrition in that part. The latter species of tumefaction appears in organs which have been long exposed to a slight degree of irritation; such parts swell become hard, lose their pliability and elasticity, and in a word, degenerate into that state known by the name of *Induration*. Although this organic lesion is most frequently observed in tissues which possess little sensibility and irritability, as the cellular substance and glands, it may

also attack those parts which enjoy these properties in the highest degree, as the skin and mucous membranes. Thus we see certain herpetic eruptions characterized by tubercles, in which the induration is circumscribed, as in gutta rosea; in other kinds, diffuse tumours in which the induration affects all the integuments of a limb, as in elephantiasis. Hence, also, we observe the mucous membrane of the larynx, thickened, indurated, and, as it were, *clotted* at the close of certain affections of that part;—the induration of the pylorus in the disease called scirrhus of that organ, that of the bladder when it has been long affected with catarrh or irritated by the presence of one or more calculi;—in like manner the mucous membrane of the urethra, irritated for a length of time, becomes thickened in one or more points, and terminates in induration. This is what happens in those almost interminable cases of gleet which precede retention of urine. In this case the inflammation which constitutes the blennorrhœa, after having affected a greater or less extent of the urethra, fixes itself particularly in one point, where it causes a thickening of the mucous membrane, and the projection of the latter into the canal proportionately impedes the passage of the urine.

Strictures may be produced by the induration of the mucous membrane alone; but occasionally the irritation extends to the adjacent cellular tissue and corpus spongiosum: these parts, which are naturally very pliant, lax, and extensible, harden and become dense; the cellules of which they are composed are obliterated, either by the adhesion of their sides, or by the deposition of coagulable matter within them; and the canal undergoes an actual strangulation in the part affected. The passage of the urine is then obstructed in a greater or less degree, both

by this coarctation, and the intumescence of the mucous membrane.

The extent of a stricture is seldom very considerable, being limited in most cases to one or two lines in length; but it is not uncommon to find several of these indurated points separated by sound parts in the same individual. The indurated parts are much more firm and unyielding than the rest of the urethra, and, *cæteris paribus*, will endure, without rupturing, a much greater degree of pressure—a circumstance of great importance, and which has been too generally overlooked.

In some rare cases indurations in the urethra have changed the course of the canal, and have caused it to deviate more or less according to the extent of the adhesions produced by the inflammation, and which draw it in various directions.

In other instances again, still less frequent, the induration, instead of being confined to one or two lines of the canal, has extended to one, two, and even three inches. Chopart, Hunter, Bell, and most of the authors who have written on diseases of the urethra, relate facts of this kind.

Strictures formed by the induration of a part of the urethra have generally a very small opening, and are distended with difficulty: accordingly we find that instruments are not easily made to pass through them. In moving a finger along the course of the canal, a small tumour is felt through the integuments which indicate the seat of the stricture, and enables us to ascertain its nature.

Bands. The obstruction of the urethra is sometimes caused by a kind of partition which divides the canal into two parts, which communicate only by a very narrow

aperture, situated, sometimes at its superior part, sometimes at its inferior, or at its sides. Here the obstacle is formed by a broad whitish filament of various degrees of firmness, but which generally offers less resistance than the coats of the urethra.

Five or six of these morbid productions have been found in the same subject; but, commonly, there are not more than one or two of them. They sometimes rest on large vascular bases, projecting into the canal, and evidently formed by the mucous membrane, thickened by repeated attacks of inflammation.

These bands have been supposed to owe their origin to cicatrices remaining from previous ulceration. The discharge which precedes their formation had given plausibility to this theory: but, it is well known at the present day, that this discharge is nothing more than a sign of the inflammation of the mucous membrane; that it does not proceed from ulcers, and that the latter are very rarely found in the canal. We will not, indeed, go so far as to deny the possibility of their existence, nor of that of cicatrices, but we admit them only as lesions of rare occurrence. It is much more conformable to the laws of physiological pathology, to consider these bands as false membranes and adhesions resulting from previous inflammation. In fact, the stricture being continually irritated by the pressure of the urine against it, when propelled by the contraction of the bladder and abdominal muscles, must frequently become inflamed; and experience has shown that acute inflammation often causes the effusion of a fluid, susceptible of organization, capable of assuming the characteristic properties of our tissues, and of uniting the parietes of the cavities in which it may be formed.

It would be natural to suppose that the formation of these false membranes would be prevented, in the urethra,

by the passage of the urine, which would carry off the product of the morbid secretion before it could unite and adhere to the adjacent parts. But this objection is controverted by facts. It has been demonstrated that false membranes and adhesions may form, not only in the urethra, but even in the interior of vessels which give passage to fluids continually circulating with great velocity—for they are to be met with in the blood-vessels.

Carnosities. Before morbid anatomy had thrown any light on the causes of retention of urine, it was generally attributed to an obstruction by fungous flesh, or fleshy excrescences, which are called *caruncles*, and *carnosities*; and it was thought that these carnosities arose from ulcers caused by gonorrhœa.

“Sometimes,” says Ambrose Paré, “in these ulcers superfluous flesh is generated, as happens in external ulcers, which hinder the semen and urine from passing by their accustomed route; whence great evils arise. Wherefore we ought diligently to guard against the said ulcers, and do our utmost to cure them: and in order to do this, it will be necessary, in the first place, to know whether they be recent, or inveterate, inasmuch as they are the more troublesome to cure, the more hard and callous they become, and the more the said carnosities become cicatrized.”

This theory has been revived at the present day, for Daran, in introducing his bougies, had no other object in view than to promote the suppuration of these carnosities.

The anatomical researches of Morgagni, La Faye, J. Louis Petit, Desault, Brunner, Hunter, Ch. Bell, and others, have proved incontrovertibly that the theory of carnosities is entirely destitute of foundation. Neverthe-

less Morgagni* found on one stricture slight excrescences of flesh. Hunter met with them twice in subjects who had had strictures of long standing. Charles Bell has also observed them. Everard Home says that he has never seen them. But it is demonstrable that these slight fleshy vegetations do not constitute the primary cause of the disorder, but *rather appear as its consequence*.

The situation of strictures is various; and if we consult authors on this subject, we shall find nothing but discrepancy and uncertainty. I have experienced in the course of my practice the necessity of ascertaining, in a prompt and positive manner, the seat of the stricture I intended to treat; and for this purpose I have employed the simple method of having my instruments marked with a graduated scale of inches, half inches, quarters, and lines.

In passing these instruments, I always know how far they have penetrated the urethra, and, consequently, the distance of the obstacle by which they are stopped. From examining in this manner a great number of persons labouring under retention of urine, I have ascertained, (as may be seen in the cases which I relate,) that in five times out of six, the obstruction is situated at a distance of from $4\frac{1}{2}$ to $5\frac{1}{2}$ inches; and, if more precision be required, that in four cases out of five it is to be found from 4in. 9l. to 5in. 3l. distant from the orifice of the urethra.†

* De Sedibus et Causis, ch. 41, art. 39.

† M. Lallemand asserts that this statement is incorrect, and that "in order to arrive at the truth, or at least a close approximation to it, it is necessary, in the first place, when a patient has several strictures at once, to disregard all but that which occupies the lowest place—that is, nearest the bladder, and afterwards examine in a given number of patients, the proportion of strictures situated in any particular part of the urethra. By proceeding in this manner, it is found that the greater number of strictures are situated at the pubic arch, that is to say, at a distance of about six inches. This agrees with the results furnished by

I have sometimes found them at the distance of four inches, and authors have observed them of great firmness at one or two inches. Twice only I have met with slight coarctations at about two inches, but they allowed the passage of a catheter of the size No. 6. Twice I have been required to treat strictures at the very orifice of the urethra, which produced the same disorders as if they had been deeply seated. C. Bell relates a case of the ulceration of the canal at the perineum, and of several abscesses at this part, caused by a stricture at the external orifice of the urethra.

Whatever may be the seat or nature of the stricture, the symptoms which attend it are nearly the same, or vary only in proportion to the narrowness of the passage that is left for the urine, and the duration of the disease. If the stricture be inconsiderable, the urine flows in a small twisted or bifurcated stream: the patient passes his water slowly, and suffers no other inconvenience than a slight scalding during its evacuation, with a sense of weight at the perineum, and itching along the course of the canal. The stream gradually becomes more slender and weak, the patient takes a longer time to make water, although he passes less at once; he also experiences a greater degree of micturition,* so frequent and so urgent as to oblige him to rise several times in the night. The discharge of the urine can be now accomplished only by continued efforts, and is attended with acute pain, and tumefaction of the penis. If, after having voided as much as he is able, the patient should repeat his efforts, he can yet procure the

the most experienced practitioners. Soemmerring was mistaken in saying that they are never found in that part of the canal which is surrounded by the prostate: they are only more rarely met with there than elsewhere.

* See note B.

discharge of a small quantity ; an evidence that the bladder has not been entirely emptied. He experiences, particularly after having retained his water some time, a sense of weight in the groins, and pain above the symphysis pubis ; if the hand be applied to the latter part, a smooth, hard tumour will be felt, which, upon being pressed, causes exquisite pain, and most commonly excites a degree of micturition. This tumour is formed by the bladder inordinately distended. In this stage of the disease, the slightest fatigue or the least excess may cause an entire obstruction of the passage of the urine, and reduce the patient to a very critical state.

But the difficulty of making water may arrive at a still greater height. Indeed, we sometimes meet with persons, in whom the stream is so feeble, that instead of being projected to a distance from the penis, it falls vertically between the legs, like the jet of a glass-cutter's wheel.*

The condition of others, again, is yet more deplorable ; the urine escaping only drop by drop, and the quantity discharged at a time not amounting to more than four or five teaspoons full, although the patient occupy ten minutes in the attempt. Persons in this state feel a constant inclination to make water ; and their existence is passed in miserable perplexity, between the desire and the dread of obeying an urgent impulse. Indeed, nothing can be more painful or exhausting than the urinary evacuation, under such circumstances ; so laborious are the efforts of the patient, that his knees tremble, his face becomes flushed, the perspiration bursts from his forehead, and the contents of the rectum accompany those of the bladder, so that the same posture becomes necessary for the latter

* See note C.

evacuation that is usually adopted for the former. A merchant, whose case will be hereafter detailed, and who had several strictures in the urethra, being reduced to this state of torture, but, nevertheless, under the necessity of attending to his business, and of passing his water in the street, was in the habit of carrying about him rolls of linen or soft paper, which he would introduce into the anus, and firmly hold there during the evacuation, in order to prevent the expulsion of the fæcal matter. The straining necessary in his case to discharge the urine, was such as to cause an enormous inguinal hernia; a disorder, indeed, not uncommon to persons attacked with retention of urine, in whom, also, for the same reason, we often meet with prolapsus ani.

Incontinence of Urine. When the stricture in the urethra is inconsiderable, it commonly produces, at the same time, both strangury and incontinence of urine. The latter symptom manifests itself in two ways: most generally, a small quantity of urine flows guttatin for a few minutes after the patient has made water. At other times the liquid escapes also in drops, after any very violent exercise. The rationale of the first phenomenon is this: the urine passing with much difficulty through the stricture, its expulsion requires strong contractions of the bladder and abdominal muscles; when these contractions have ceased, that part of the urethra which is behind the obstruction, contains a certain quantity, which being higher than the opening in the stricture, flows in drops by the mere force of gravity, and falls upon the clothes. If, under such circumstances, the patient neglect to change his linen with suitable frequency, he will be constantly bathed in urine, and diffuse its disagreeable odour wherever he may go.

The other species of incontinence is produced in a different manner; and occurs only when the expulsion of urine is extremely difficult. In such cases the bladder being almost constantly over-distended. The accumulation of the fluid is no longer limited by the neck of this organ, the sphincter relaxes, the urine dilates that part of the urethra which is behind the obstacle, and it is then the latter and not the neck of the bladder by which it is confined. Whenever, in such a situation, the patient coughs, walks fast, or exercises his body in any manner, the contraction of the abdominal muscles compresses the bladder, and propels some drops of water through the opening in the stricture in such a manner as to wet the linen. Here it is very difficult for the patient to avoid uncleanness and fœtor, for the fæcal matter is often expressed at the same time with the liquid excretion.

Complete Retention. Whatever be the degree of strangury—whether the urine flow in an extremely attenuated stream, in an uninterrupted succession of drops, or only drop by drop, there is yet an aggravation of the disorder to be apprehended far more serious in its consequences; namely, the impossibility, of passing a single particle of urine—constituting what is called complete retention.

The least imprudence, the most trifling excess may occasion this terrible consummation. And this we may easily conceive; the strictured portion of the urethra, continually irritated by the pressure of the urine forcibly propelled against it, is rarely free from inflammation, which, if it be but inconsiderably augmented, will cause a greater afflux of humours in the vessels of the part affected; hence a greater or less degree of tumefaction, which may increase the stricture so much as to obstruct the passage of the urine completely.

Besides,—this inflammation is attended with the secretion of a thick tenacious matter which accumulates at the inflamed part, and forms a new obstacle to impede the course of the water. There are few practitioners, who, in introducing the catheter in such cases, have not found it covered with this kind of matter on introducing it.

The sufferings, the anguish of a person labouring under complete retention of urine, can be equalled only by the urgency of the danger which threatens him. The desire of making water is felt incessantly, and is accompanied with the most exquisite pain; the bladder, hard as a stone, rises to the umbilicus; the abdomen is tense and painful—the latter symptom being much aggravated by pressure—the skin is hot; the pulse hard and frequent; the face flushed and animated with an unnatural vivacity; the patient becomes restless and agitated, and if the symptoms continue, falls into a furious delirium. If the discharge of urine be not speedily effected by the efforts of nature, or the interposition of art, the patient will be in imminent danger. The urine continuing to accumulate behind the stricture, in the urethra, bladder, ureters, and even in the very kidneys;—the latter, doubly irritated both by distention and the presence of an acrid fluid, become inflamed, and sometimes this inflammation extends to the peritoneum, and gives rise to the most intense peritonitis. Again, and this is what most frequently happens, the inflammation becomes so intense in the part which is most distended and irritated, namely, that part of the urethra situated behind the obstruction, that it becomes gangrenous, occasionally it is ruptured, and, in either case, the dreadful consequences of an extravasation of urine are the result. It happens now and then, though rarely, that the rupture takes place in the fundus or body of the

bladder itself;—the urine is then effused into the abdomen and death is inevitable.

Urinary Sweats. During this excessive distention of the urinary organs, nature has been known to make an effort for relief, equally salutary and unexpected. The skin of the sufferer is sometimes moistened with a copious perspiration, exhaling a well-defined urinous odour: in proportion as this sweat escapes from the surface of the body, the distention of the bladder diminishes, and it appears manifest that the urine actively absorbed within the urinary organs, is transmitted to the exhalent vessels of the skin, and thus discharged.

This salutary crisis is, unfortunately, very rare; but it not unfrequently takes place in an imperfect manner. Indeed, it is common to see a person afflicted with complete retention of urine covered with perspiration emitting an urinous odour.

Retention of Semen. The emission of semen, like that of urine, is not accomplished at will by those who have strictures in the urethra: accordingly they are, for the most part, unfit for the procreation of the species. The ejection is imperfect and often impossible; the prolific liquid is then retained behind the obstacles, and issues shortly after coition, when the erethism has subsided. It occasionally happens that at the moment when the venereal orgasm is at its height, a lancinating pain is felt in the urethra, and, instead of semen, some drops of blood are projected from the penis; this blood proceeds from the rupture of some small vessels in the part inflamed.

Sexual intercourse almost always increases the difficulty of making water; because it cannot be enjoyed with-

out the canal, and particularly the strictured part of it, undergoing a certain degree of irritation, and this is often sufficient to produce inflammation.* It is to this that we must attribute the running experienced after coition, by persons who have strictures in the urethra. They imagine they have contracted another gonorrhœa, and are treated accordingly. Home relates that a man, 70 years of age, having had connection with his servant, whom he had reason to believe healthy, was affected the next morning with a running and ardor urinæ, so as^{to} induce the belief that he had caught a gonorrhœa. He sought the advice of a surgeon of celebrity, and was cured in less than eight days. He forthwith repeated his exploit, and the next morning the discharge and heat returned. He now consulted Home, who discovered that a stricture in the urethra had occasioned these attacks of apparent clap.†

The running now under consideration, differs greatly from that of gonorrhœa; it manifests itself immediately after coition, and is attended with but little inflammation and pain; it acquires its greatest intensity on the very first day of its appearance, after which it remains stationary for two or three days, then diminishes and disappears in less than a week. On the other hand the gonorrhœal discharge is preceded by an itching along the course of the canal; it rarely makes its appearance before

* It is a curious fact that the cold stage of a paroxysm of intermittent fever has been observed to produce a similar effect. The north and east winds are also said to be more unfavourable to this state of the urinary organs than those from the south and west.

Jourdan. *Traite Complete des Maladies Veneriennes*. Vol. i, p. 55.

† Home's Treatise, vol. i, p. 54.

the third day after the suspected connection, and most commonly not until after the fourth day. It increases continually, and is accompanied with pain and symptoms of intense inflammation.

Febrile Paroxysms. Although a stricture in the urethra be a purely local disease, the excretion of the urine, which it prevents, is a function of too much importance not to affect the general health of the person in whom it is interrupted: accordingly it is rare to see a man having stricture in the urethra and at the same time enjoying full health. His digestion is more or less depraved, and he often manifests an inordinate irascibility. But the most remarkable consequence experienced by persons in such a condition, is an attack of fever more or less complete, and coming on at indeterminate periods. In some it consists of an intense head-ache, with heat of the skin and acceleration of the pulse; others have a chill which is followed by a slight sweat, but without increase of temperature. In others again,—and these are the most numerous—the paroxysm commences with a violent chill and rigors followed by a hot skin, frequent pulse, and sometimes delirium, terminating in copious perspiration; presenting, indeed, all the characters of a regular fit of intermittent fever. One thing is remarkable, that during these exacerbations, the irritation in the urethra is not increased; the redness of the orifice of the gland is not greater than usual; there is no swelling of the penis, nor at the perineum, and the urine does not pass with more difficulty than before.

These paroxysms return at longer or shorter intervals, but always irregularly. I have known patients who experienced them as often as three or four times a month. It has often happened that physicians not conversant with

the diseases of the urinary passages, and supposing these to be cases of irregular intermittent fever, have combatted them with cinchona—but unsuccessfully. Sir Everard Home relates the history of a patient who had been prescribed the use of it for three years, without any abatement in the symptoms, which were finally removed by the cure of the stricture in the urethra.*

Such are the most prominent symptoms of a stricture in the urethra : their presence constitutes the diagnosis of this disease. To recapitulate summarily—whenever a person makes water with difficulty, and in a very small stream—when his attempts are frequent, but productive of a scanty discharge—when he constantly, or at intervals, feels a sense of weight at the perineum—itching along the canal—a flow of mucus, and irregular paroxysms of fever—we are almost positively certain that such a person has one or more strictures in the urethra.

We may ascertain the truth by introducing a bougie into the canal : if the instrument be stopped in its progress, or tightly wedged in a particular part of the route through which it has to pass, the existence of a stricture ceases to be doubtful.

We will point out, when exposing our mode of treatment, a manner of conducting the examination by which we may learn at once, the form, situation, and calibre of the strictured part. The method consists in procuring an impression on wax.

* See Note D.

SECTION III.

Of the Consequences and Concomitant Disorders incidental to Strictures in the Urethra.

A stricture in the urethra occasions disorders more or less dangerous in the parts, which, following the course of the urine, are situated behind the obstruction. These parts are that portion of the canal lying between the obstacle and the bladder, the organs destined for the secretion and excretion of the semen, the prostate gland, the bladder, ureters, and kidneys.

The part of the urethra which is behind the stricture, retaining its natural dimensions, receives from the bladder during the discharge of urine, more of this fluid than the obstacle will suffer to pass at a time; the latter, therefore, represents a kind of dyke, which confines a part of the water that flows against it. In this state of things, the urine, continuing to be impelled with force by the contraction of the bladder and abdominal muscles, presses more and more upon the part of the urethra posterior to the obstruction, and distends it beyond measure. This distention, which the urine keeps up in the parietes of the urethra, ends by attaining such an extent as to form a sack behind the stricture capable of admitting one's thumb, as has been seen on inspection of the body after death. Chopart attended a man in whom a similar dilatation of the canal formed a tumour in the perineum as large as a hen's egg.

It will readily be conceived that so sensible a part as the urethra could not long endure such extreme distention and violence, without becoming the seat of irritation and of inflammation more or less intense. This inflammation

is indicated, during life, by the sense of weight at the perineum, the itching in the course of the canal, and the perpetual running which the patients experience. After the death of those who have sunk under the consequences of retention of urine, this lesion is equally well demonstrated by the congestion and thickening of the mucous membrane, which is usually found coated with a layer of muco-purulent matter.

In those cases in which the urine is expelled with extreme difficulty, this inflammation sometimes increases to such a degree as to terminate suddenly in gangrene. At other times it occasions an ulceration which erodes and perforates a portion of the canal; finally, this part of the urethra, attenuated and enfeebled by distention, is ruptured behind the stricture. In either of these cases the urine which had been confined by the obstacle, escapes through the fissure, infiltrates into the cellular tissue, insinuates itself from one cell to another, and fills the adjacent parts, which being pliant and distensible, are easily penetrated. The scrotum now becomes as large as the head of an infant; the perineum and penis are distended enormously; the infiltration often extends to the groins, the lower part of the abdomen, and even for some distance down the thighs.

This complication is attended with the most formidable consequences; for the urine causes a mortification wherever it percolates. In fact, these parts are soon perceived to be attacked with the most violent inflammation; they become red, violet, and of a livid hue; black sloughs are soon formed, and when they separate a fetid sanies mixed with urine escapes, bringing away fragments of gangrenous skin and cellular substance, and a prodigious ulcer marks the extent of the devastation. "Practitioners," says Bichat, "who have not been in the habit of ob-

serving these diseases, might be dismayed at the extent of the ulcer arising from the separation of the sloughs. Sometimes the whole scrotum, the integuments of the penis, that of the groins, of the perineum, and of the upper part of the thighs become gangrenous, and the denuded testicles suspended by the spermatic cord, float in the midst of the enormous ulcer."

If art do not seasonably relieve the patient who labours under an infiltration of urine, if extensive openings and free incisions do not at the very commencement afford a passage for the escape of the urine, the patient almost always sinks on the appearance of the first symptoms. If, however, he do survive, the fever, which has been very violent, especially before the opening of the abscess abates a little, the ulcers present a better appearance, they become covered with red granulations, and the surrounding skin daily approaches nearer the centre of the ulcer and tends to close it. In the mean while, the fissure in the canal continues to allow the escape of the urine, and cicatrization is prevented in those parts of the ulcer over which it flows. There remain in these places several openings which have no disposition to close, and which, alone, or together with that part of the urethra anterior to the stricture, serve for the excretion of the urine: these openings are called *urinary fistulæ*.

These urinary fistulæ are unnatural passages, formed by ulcers which extend from some point in the urinary canal to one or more spots on the surface of the body, and afford a channel for the escape of the urine. The external orifices of these fistulæ are sometimes very distant from their internal openings. Thus, they have been seen on the sides of the thorax, on the parietes of the abdomen, in the groins and thighs; but most commonly they are found in the perineum, scrotum, or nates. These aper-

tures are the sources of suppuration in greater or less abundance, the product of which soils the linen of the patient, and emits a very strong and disagreeable odour. During the emission of urine, a part of the liquid, and often the greater part, passes through these outlets, and flows upon the surrounding parts. In some cases the secretion of the kidneys escaping readily through these channels, while the passage in the urethra continues to be very circumscribed, abandons the latter route altogether, which at length becomes completely obliterated. This renders the condition of the patient much more harrassing, and increases the difficulty of curing his disorder; for here the difficulty of the treatment will no longer consist in finding and enlarging an opening which already exists, but we shall be under the necessity of forming a new one, with scarcely any thing to guide us in the operation.

The extraordinary course pursued by the urine through the soft parts; the passage which it has forced for itself, inflames, indurates, and becomes dense: it is evident that nature is endeavouring to form a new channel for the urine, which by the thickness of its sides might prevent any further extravasation of that fluid into the circumjacent regions. The longer the duration of the fistulæ, the more dense and callous are the parietes of this artificial channel. A remarkable phenomenon now takes place: the internal surface of this canal, which is continually in contact with the urine, assumes the characteristics of the mucous membranes, and like them becomes the seat of a glairy secretion.

Whether fistulæ have one or more openings or not, their course being generally tortuous, unequal, and narrower at some parts than at others, does not allow the urine to pass freely through them: hence arises a new infiltration, new abscesses and sinuses which excavate in

different directions the parts adjacent to the urethra, and progressively disorganize them. The tendons and aponeuroses, the bones themselves are sometimes denuded, and become the seat of caries of various degrees of extent, which aggravates the misery and the dangers attendant on the condition of the sufferer.

The urine, in flowing through these anomalous passages, and particularly when impeded by the tortuous irregularities which they present, sometimes deposits matter which forms calculi, that may acquire a very considerable magnitude. One of these has been extracted of the weight of 10 ounces 6 drachms: another of 13 ounces, and another of 18 ounces.*

A urinary fistula is always a dangerous disease, on account of the debility to which it reduces the patient; the other disorders which it may introduce, and the difficulties which attend its cure, especially when a considerable extent of the canal has been destroyed by gangrene. Let us illustrate this case by an example.

A butcher, 46 years of age, of a robust constitution, after several attacks of gonorrhœa, experienced a difficulty in making water, in which he suffered a great deal, particularly after the commission of any excess. He experienced a complete retention, which was combatted by bleeding, baths, and emollients, but unsuccessfully. The patient not consenting to the forcible introduction of the catheter, a bougie was introduced into the urethra, without, however, traversing the stricture, notwithstanding which, it was left in the canal: it had no other effect than to aggravate the irritation already seated there, without procuring the passage of a single drop of urine. After

* See *Memoirs of the Academy of Surgery*. Vol. VIII. p. 335. 343. 358. *Chopart*, vol. II. p. 334.

a second bleeding, which produced no relief, leeches were applied to the perineum, which gave some ease.

In a short time the pain returned with renewed violence; the micturition became more and more distressing, and the continued efforts of the patient were entirely fruitless. He then permitted his surgeon to sound him, but the latter could not accomplish it. Louis and Chopart were then called in. "All our attempts," says Chopart, "to introduce a catheter of any size whatever, were as unsuccessful as those of the surgeon in attendance: we met with a degree of resistance at the bulb, which at the time appeared insurmountable; the prostate, nevertheless, was not enlarged, and there was no tumour at the perineum. *Some blood had flowed from the penis, at the first trial that had been made to introduce the catheter, and there also issued some during those which we made for the same purpose.* As the symptoms of retention were very urgent, the abdomen being very much distended, especially in the hypogastric region, we saw no other resource in this state of things, than to puncture the bladder above the symphysis pubis. The patient would not consent to the operation. During the evening the urethra burst, (it had probably been lacerated by the catheter,) and infiltration of urine took place in the surrounding parts."

The scrotum, penis, and groins soon acquired a very great size; convulsions ensued, with delirium and syncope. The next day the pulse was small and intermittent—*the scrotum as large as the head of an adult*; the upper part of the thighs became œdematous, and a large, livid, and black spot appeared at the perineum. A free incision was made, and the parts were evacuated; the pulse rose—the sloughs separated, and *laid bare the prostate gland, a large portion of the urethra, and the tunica vaginalis of the testicles.* Some days afterwards, the swelling of the

penis having in a great measure subsided, a catheter could be introduced into the canal; its naked point could be seen in the middle of the perineum, *more than an inch distant from the opening which gave passage to the urine.* It was afterwards introduced into the bladder, where it was suffered to remain; which, however, did not prevent the urine from escaping in part by the fissure. After a treatment of three months, there remained nothing more at the perineum than a fistulous opening: the patient wore the the catheter for a month, but the aperture did not close. Bougies were afterwards introduced, but with no better success. Several months afterwards, a urinary abscess formed in the right buttock, which opened and remained fistulous. The difficulty of passing water returned; the fever assumed the continued type, with exacerbations; the abdomen swelled; hiccough and delirium were added to the other symptoms; and death put a period to the miseries of the sufferer.

The inflammation and distention of the urethra behind the stricture, the sources of all the evils we have just described, may also occasion others. It is admitted that inflammation does not always confine itself to the irritated organ, but afterwards extends to the parts in its neighbourhood: it is thus that the inflammation of a tooth is communicated to the investing cellular substance, and causes an abscess in the gum or in the cheek—that an inflammation of the interior of the larynx gives rise to an abscess in the parts surrounding the cartilages of that organ—that chronic irritation of the arms occasions an abscess in the nates;—so the inflammation of the urethra extends, in some cases, to the surrounding cellular tissue, and causes the formation of an abscess.

The deposition of pus in this place is announced by a sense of uneasiness and weight in the perineum; in a short

time a small tumour makes its appearance in this part,—increases in size—becomes the seat of pulsating pain—and manifest signs of fluctuation soon appear; the patient at the same time experiences chills and a certain degree of fever. The tumour grows larger, and becomes more soft daily; and if the pus be about to make its way through the skin of the perineum, the integuments in this place become thin and ulcerate, and a certain quantity of a white homogeneous pus, without any proportion of urine, makes its escape. On the other hand, the skin sometimes remains untouched, and the abscess opens into the canal. If the aperture which yields a passage to the purulent matter be behind the obstruction, the urine, being interrupted in its course, enters the cavity of the abscess, and produces all the mischief of a urinary infiltration. If, however, the opening be situated before the stricture, the canal being unobstructed beyond it, the water meets with no impediment in its course, and may pass over the abscess without entering it or producing extravasation.

In certain cases these abscesses soon close up, and the patient finds himself in the same state that he was before their formation. But, on the other hand, they occasionally refuse to heal, and the orifice through which the matter passes becomes fistulous: having arrived at this stage, the disease receives the name of incomplete external fistula, when its only opening is in the skin; and of incomplete internal fistula, when it is in the urethra. These ulcers have been improperly denominated internal or external blind fistulæ.

Some authors admit the existence of an incomplete internal or blind fistula, into which the urine may penetrate without any evil consequences. Besides the want of any positive evidence of the possibility of such a lesion, I am

not disposed to accede to the opinion, because it does not accord with the results of observation. It is, indeed, difficult to conceive how a fluid, which, in escaping from its natural channels, causes mortification in all the parts it traverses, could remain innocuously in the cavity of an abscess. I think there can be but one way of considering those abscesses which open internally into the urethra; they either close without the urine having passed into them, or they become complete urinary fistulæ when the contrary takes place.

The sinuous ulcer which constitutes the incomplete or blind external fistula, is kept up by the denudation of the urethra, and particularly by the constant separation of the sides of the abscess. In fact, when the ulcer is situated near the root of the penis, or below the scrotum, the weight of the latter tends perpetually to remove the inferior part of the ulcerous cavity from the superior—a state of things which renders their approximation and subsequent adhesion extremely difficult. Besides, in many cases, the minuteness of the orifice, and the crookedness of the course of the ulcer, prevent the free passage of matter, which forms an additional impediment to cicatrization, and sometimes even gives rise to the formation of new sinuses.

Swelling of the testicles is an affection which persons who have strictures in the urethra very often experience, and which is nothing more than a consequence of the inflammation of that part of the urethra situated behind the obstruction. This inflammation extends in the first place to the mouths of the excretory seminal ducts; thence it passes on by degrees to the vesiculæ seminales and vasa deferentia, until it arrives at the glands. The one to which the inflammation is communicated in this manner, swells, sometimes acquires the size of a turkey's egg, and becomes the seat of acute pain. The patient, in the mean time, is

feverish and restless. The course of the disease is generally rapid; the swelling increases for seven or eight days, then diminishes gradually, and disappears about the 20th day. Sometimes the resolution is incomplete: the testicle, without being very painful, remaining morbidly sensible and of an unnatural size; the affection then passes to a state of chronic enlargement, and may last an indefinite length of time. Everard Home relates a case of similar enlargement, which disappeared completely on the removal of a stricture in the urethra.*

From the observations of this author, it evidently appears that the serous membrane, the tunica vaginalis, which invests the testicle, may, by contiguous sympathy, become the seat of an inflammation, referable to no other cause than the presence of a stricture in the urethra, and the continued irritation of the posterior division of the canal. The inflammation of the tunica vaginalis, like that of all the other serous membranes, is immediately followed by the secretion of a certain quantity of the serous fluid, which lubricates their internal surfaces in the healthy state. This, when accumulated, forms a watery collection or dropsy, which, in the tunica vaginalis, receives the name of hydrocele. The author above cited, mentions three cases in which the removal of the obstructions in the urethra caused the disappearance of hydrocele of great magnitude.

The bladder, in those who have strictures of a tolerable size in the canal, discharges only so much of its contents as to preserve itself from over distention, and remains constantly in a greater or less degree of plenitude. Although the urine passes in a very small stream, one would be disposed to believe that the patient might, by employing

* Home's Treatise, vol. II. p. 289.

the time necessary, empty his bladder as completely through this narrow channel as if it were of much greater calibre. If this supposition were well founded, the patient would void, at a time, as much urine as when in health, and should not be able to procure more by repeating his efforts immediately after having made water; whereas the very reverse of this happens. I have reflected on this circumstance, and often asked myself the question—why cannot the bladder discharge above one fourth of its contents, when there exists but an inconsiderable stricture in the urethra! What is the cause of this fact? Is it in the canal through which the liquid passes; in the liquid itself; or in the sack which contains and expels it? It cannot be in the canal, for as it allows the passage of one fourth of the urine, it might in time suffer the other three to follow, if they were presented to it like the first. It is not in the liquid itself; for that which is evacuated presents precisely the same characters as that which is retained. The cause must therefore be in the sack which contains and expels the liquid. These considerations made me conclude that the cause of the phenomenon in question lies in the bladder.

In the meanwhile, anxious to be further enlightened on this subject, I conceived the idea of subjecting myself to some experiment which should place me, as regarded the emission of urine, in the condition of a person with a stricture in the urethra; and I easily found means to accomplish my object. When strongly urged by a desire to make water, I compressed my penis, near the glands, in such a manner as to allow the urine to pass only in a very small stream. I soon experienced great pain in the course of the canal; the desire of evacuating the bladder became more vehement, and the efforts of expulsion more considerable. It was not long before I felt a painful sense of

gravitating pain* in the region of the bladder and in the groins, and the canal at length gave me such anguish, that I mechanically removed my hand, and restored its natural calibre. I afterwards repeated the experiment with more resolution; the same pain and torture were endured, and became so exquisite, that it appeared as if the urethra would burst, though I had no apprehension of such an accident. At short intervals the pains increased in violence; gradually, however, they diminished, and I ceased to make water, although I had not voided half my usual quantity. The pain still continued very considerable in the urethra. After the lapse of a few minutes, wishing to know whether I had completely emptied my bladder, I attempted to make water, and passed about as much as had flowed during the experiment. This operation I have repeated several times, and always with the same result. Hence I have concluded, that it is the nature of the contraction of the bladder not to be durable, and that after a certain time it ceases, notwithstanding the continued action of the stimulus by which it was first excited; consequently that the ejection of urine is incomplete in cases of stricture, because the time required for its passage, far exceeds that for which the bladder may continue its contraction; and which is still more shortened by the patient, as far as lies in his power, on account of the pain which it occasions him. Directing my attention afterwards to the contraction of other muscular parts, I found it durable in none, and that all require intervals of relaxation, though habit may diminish the permanency of the latter.

To return to our subject: the bladder, in persons who have strictures in the urethra, is in a state of continual plenitude and distention. The consequence is an irrita-

* Tiraillement.

tion, which this sack cannot sustain for any length of time with impunity ; in fact, being incessantly distended and irritated by the urine, the retention of which renders it more acrid and corrosive, it becomes very sensible, irritable, and ultimately inflamed.* In this event, the presence of the urine is still more intolerable, and the endeavours to discharge it are more vehement, frequent, and distressingly painful. This new disease greatly aggravates the sufferings and danger of the patient. For the immediate consequence of inflammation in the lining membrane of the bladder, as in all other mucous membranes, is a copious secretion of the viscid matter by which it is lubricated. Hence the glairy substance which renders the urine flaky and turbid. This viscid matter being much more consistent than the urine, passes the strictured portion of the urethra with great difficulty ; it often accumulates behind this part, presses upon it, and gives rise accidentally to a complete retention of urine ; but it generally collects in the bladder, where it undergoes decomposition, increasing the irritation of that viscus, and imparting a fœtid odour to the urine, which is then said to be ammoniacal.

It is entirely impossible to describe the anguish of the patient whose malady has reached this height. His life presents a weary succession of pains and privations. Excessive micturition incapacitates him for the pursuit either of business or of pleasure ; it compels him to confine himself, and live in seclusion ; or, at most, suffers him to appear in the company of others but a few minutes at a time ; his sleep is interrupted by frequent and urgent calls to satisfy this law of nature. Some patients have been known to rise for this purpose 15 or 20 times in the course of a night, particularly after any sensual indul-

* See note E.

gence, which never fails to increase the pain and difficulty of making water, so as often to cause the apprehension of complete retention.

In some cases, the disorder pursues a still more terrible course: an ulceration of the bladder takes place, and suffers the urine to escape, which distends the cellular substance in the pelvis, penetrates beneath the peritoneum, and sometimes perforating it, diffuses itself through the abdomen, infiltrates into the perineum, penis, scrotum, &c. producing, on all sides, inflammation, suppuration, and gangrene. Patients rarely survive such an event; however, the extravasation may be confined to the pelvis and external parts immediately adjacent, and not prove mortal. He then escapes with life, but labours under a dreadful infirmity; the opening in the bladder not closing, a fistulous passage is formed between that organ and the external surface, through which the urine constantly escapes. The condition of such a patient is more intolerable than in the case of fistula in the urethra; in the latter affection, the urine accumulating in the bladder, the sufferer has to protect himself from it only at the time of its expulsion; in fistula from the bladder, on the contrary, the patient has no control over his water; it is not retained in its receptacle, but flows out as fast as it drops from the ureters.

Catarrh, or inflammation of the bladder, produced by a stricture in the urethra, is always a troublesome and dangerous disorder; and it will be so in proportion to its duration and the age of the subject. If the bladder retain its natural size, and if, during its distention, the tumour formed by it above the symphysis pubis be plainly perceptible, the destruction of the stricture in the urethra will be sufficient to dissipate the catarrh, although the urine shall have already become mucous and alkaline. But if,

on the contrary, we can feel no tumour formed by the distended bladder--the patient retain a small quantity of urine, and be above 60 years of age, the removal of the obstruction will not cure him completely. He will pass his water with ease, but in small quantities at a time; the bladder, contracted, thickened, and disorganized by the inflammation, can no longer receive a large quantity.

Vesical catarrh is often accompanied by an enlargement of the prostate gland; and what has been said of the one affection is applicable, with a very little difference, to the other. Although the congestion be considerable, if there be no disorganization in the tissue of the gland, it will disappear so soon as the irritating cause from which it arose shall have ceased to act. If, however, the prostate have been excavated by abscesses and sinuses, and its tissue altered by the disease; if its surface be covered with fungous tumours, as frequently happens in advanced life, the destruction of the stricture will but mitigate the sufferings of the patient.

We have already observed that, when the bladder is inordinately distended, the accumulation of the urine extends along the ureters, and even as far as the kidneys; these organs then undergo a certain degree of irritation, and the ureters become so enlarged as sometimes to equal in calibre one of the small intestines. It is to this distention, and the irritation occasioned by it, that we must attribute those pains, and that sense of weight felt in the loins, by those who labour under retention urine: these pains are sometimes exquisite, but cease as soon as the obstacle impeding the evacuation of the urine is surmounted. Home relates the case of a man, 43 years of age, who experienced, in the region of the left kidney, pains which returned in paroxysms, with extreme violence, every time that he attempted to make water. He dimin-

ished the force of these exacerbations by taking opium in doses of five grains—of which he took about fifty grains during the day. Home discovered and destroyed a stricture in his urethra, and the patient was entirely relieved from his pain.

The formation of calculi in the urinary passages, is an extremely distressing complication of retention of urine, caused by a stricture in the canal; for these bodies, unless they be extremely minute, cannot clear the obstruction: they remain behind it, therefore, and increase in size. Sometimes the number of calculi detained by the obstacle is very considerable. On opening the body of an old man who had long suffered from retention of urine, a large stone was found in the bladder, and twenty calculi in the membranous portion of the urethra, which formed a large cavity, bounded anteriorly by the stricture: at the distance of two inches from this stricture was another, behind which was a black calculus of considerable magnitude.

Generally, the calculus, being pressed by the urine, rests against the opening in the stricture, which it closes like a stopper; the consequence is, a complete retention of the most obstinate character, and which often proves fatal. Hunter, Home, and Charles Bell have, by engravings in their works, represented, in a very satisfactory manner, the appearances of the urinary passages in persons who have died from this cause.

The following case is worthy of note, as it may lead to the diagnosis of the complication in question:—

A patient, having a stricture in the urethra, could pass his water only by introducing a very fine catheter into the canal, and leaving it there as long as the urine flowed. The obstruction having been removed by caustic, two calculi, one of which was of considerable size, escaped

from their confinement ; and from that time the sufferings of the patient entirely ceased. In this case, the urine pressed the calculus against the opening in the stricture, in such a manner as completely to close it ; but the patient introducing a small bougie, pushed back the calculus, and the water flowed between the sides of the instrument and the aperture in the obstacle.

CHAPTER II.

Treatment by Dilatation and Compression.

THE disease described in the preceding chapter, arising only from the obliteration of the urethra to a certain degree, in one or more points, the whole treatment is founded on this indication : viz.—*to destroy the obstacle which opposes the passage of the urine.* Attempts have been made to fulfil this indication in two ways: either by repressing and levelling the projecting parts, constituting the stricture, by mechanical means; or, by actually destroying their substance. The former method constitutes the treatment by *dilatation*, vulgarly denominated *treatment with bougies and catheters*, because it is conducted by means of these instruments.

SECTION I.

Treatment with Bougies.

Bougies are flexible and solid instruments, either cylindrical or slightly conical, from 8 to 10 inches in length, and proportioned to the diameter of the urethra into which they are introduced for the purpose of restoring a passage to the urine. The origin of these instruments is very ancient. Alphonso Ferri maintains that they were known to Alexander the Greek, who, according to Astruc, is the same with Alexander of Trales, who flourished in the sixth century.

Andreas Lacuna, a physician of Spain, who wrote in 1551, attributes their invention to one of his cotemporaries, a Portuguese empiric, named Philipppo. But Ama-

tus Lusinatus, who wrote three years later, assures us that Filippo had learned the use of bougies from him, for which knowledge he was himself indebted to Professor Aldereto, a physician of Salamanca. These bougies were formed of linen and wax, and at their ends were fastened in a very ingenious manner, substances of a caustic nature, to erode what were in those days called *carunculæ* : I shall advert to these in describing the treatment by cauterization.

Great alterations have been made in the composition of the kind of plaster used in the fabrication of these instruments, with a view to impart to them the properties of dissolving, cicatrizing, softening, &c. Now that the manner in which they act is better understood, it is less an object to give them medicinal qualities than a proper consistence, smoothness, and flexibility.

Bougies, whatever be their composition, produce a three-fold effect upon the urethra : they dilate, compress, and irritate it. The attention being confined to but one of these effects, bougies have alternately been proposed to dilate, to compress, to dissolve, to discuss, and to cleanse the *carunculæ*.

Cat-gut bougies, were devised to answer the first of these indications. When these are introduced into the canal, they swell, by absorbing the moisture of the parts, and thus enlarge the stricture. They have now been almost entirely abandoned, because their points being irregular and hard, may easily lacerate the coats of the canal, and even perforate them. They are, besides, too stiff during their introduction, and if it be necessary to leave them in for some time, they absorb the humidity and lose their consistence, at the same time that they increase in size, by which their subsequent introduction is rendered impossible.

Leaden bougies. Experience has proved that compression is a very powerful means of promoting the discussion of tumours;* and it has been thought that bougies destroy callosities in the urethra, only by the pressure which they make against them. It has, accordingly, been proposed to employ bougies of lead, on the supposition that their efficacy would be in proportion to their weight. But this estimate is applicable only to that side of the canal which supports the bougie, and not to the others. The use of these bougies has been abandoned—in France at least—because, the leaden wire, when small enough to pass a tolerably sized stricture, has not the firmness requisite for its introduction, but catches and bends in the first irregularity that it meets. When we have made some progress in the treatment, and would introduce instruments of middle size, not to mention large ones, they are inflexible and hard, and cause exquisite pain, inflammation, congestion, and abscesses in the neighbourhood of the canal.

Plaster bougies and those of gum-elastic, dilate the urethra, not by increasing in bulk, like those of cat-gut, but in the manner of a wedge, separating with a certain degree of force the parietes of the stricture. These are in close contact with the bougie by which they are compressed: and this is the true mechanism of the compression of stric-

* Compression has been much employed lately, particularly in England, in the treatment of external disease, more especially in ulcers of the extremities, cancerous breasts, and rheumatism. Dr. Baynton has published an excellent monography on the treatment of ulcers by compression—a work not sufficiently known in France. Mr. Samuel Young has, in two different papers, demonstrated the surprising results of this method in the treatment of cancer of the breast: his experiments require confirmation, and should be repeated. M. Balfour has written a work of merit on the use of compression in rheumatism. The reader will find my analysis of this work in the *Journal generale de Medecine*. Sept. 1820.

tures; it is owing to the reaction of the distended part upon the distending cause, and not to the weight of the latter. This reaction is generally sufficiently powerful to produce a depression on the point of the bougie. This fact, hitherto neglected, will furnish us with an important guide in practice.

We have asserted that bougies produce a third effect, that of irritating the canal whenever any of our organs which is not naturally in contact with foreign bodies, is exposed to this contact for a certain time, it undergoes an irritation proportionate to the violence sustained. Hence, bougies, whatever be their composition, irritate the urethra; this irritation soon determines a greater or less degree of inflammation in its mucous membrane, and every inflammation of these membranes occasions an augmentation of the secretion of which they are the organ. In this manner we account for the discharge occasioned by the introduction of bougies. This phenomenon gave rise to many absurd theories, which represented this discharge to consist of the acrid matters, which caused the disease by irritating the urethra; or as the result of the dissolution of the carunculæ; the congestion of the lymphatic glands &c. and the more it increased, the more their authors extolled the solvent virtues of the bougies. The irritation produced by the presence of bougies, entirely destitute of medicinal properties, is sufficient to occasion this effect, as is proved by the daily use of those of gum-elastic; and it can be excited at will in the sound urethra, as well as in that which contains strictures—sufficient evidence that the dissolution of the latter cannot be its true cause. If bougies, which only act mechanically, will irritate the canal sufficiently to cause a running, those which are medicated with acrid and stimulating substances, will determine it much more speedily

and in greater abundance;—together with all the symptoms of an acute inflammation of the urethra, and of a violent gonorrhœa.

The choice of proper bougies is, therefore, a matter of great importance. Those composed of linen and a plastic substance which is not irritating, cause, in my opinion, the least inconvenience; for they accommodate themselves perfectly to the form of the canal, and irritate it less than the other kinds; but the practicability of their introduction, is, as we shall hereafter see, very uncertain. Next to these I should prefer hollow bougies of gum-elastic, because we may introduce within them a thin rod of lead wire, by which their firmness may be increased, at the same time that they preserve sufficient flexibility to yield to the sinuosities of the canal. Solid bougies, made of gum-elastic and silk thread, have not sufficient consistence to be introduced of such a size as is necessary at the beginning of the treatment. Gum-elastic bougies are all made *conical*. I have seen some of these instruments which were about two lines in diameter at one extremity, and pointed like a pin at the other; they are stiff, inflexible, and if a little force be applied in their introduction, they perforate the canal, and force a false passage.

The composition of bougies causes no difference in the mode of using them, and we proceed in the treatment with those of one kind, precisely as with those of another;—in the following manner. Having selected a small bougie, it is lubricated with oil or lard, and after the patient has passed water, the surgeon places him before him, when, seizing the instrument in the middle with the index and thumb of the right hand, the penis is raised with the fingers of the left; the point of the bougie is introduced into the orifice of the gland, then passed into the canal

with a slight rotatory motion, care being taken at the same time to elongate the penis as much as possible, in order to efface the rugæ of the urethra. When the point of the bougie has reached the symphysis pubis, the penis is depressed, so as to diminish the curvature of the canal, and the pressure upon the instrument is continued until its introduction is completed. If it be arrested in its progress, it is to be withdrawn a little way, and then returned, repeating the attempt until it be made to advance. Its introduction may also be facilitated, by supporting that part of the canal at which it stops, with the fingers. This is particularly useful when the bougie meets with an obstacle at, or near the curvature of the urethra; in that case the fingers are applied, and bent in the direction of the canal. In this way the point of the instrument is raised, and its advancement promoted. When the obstacle which impedes its passage is still more distant, it is often useful to introduce a finger in the rectum, in order to reach that part of the canal at which the instrument stops.

When we shall have come to the use of large bougies, it will be necessary before attempting their introduction, to give them a curvature similar to that of the urethra, in order that they may pass it more easily. If this precaution be omitted, we shall be obliged to employ considerable force, so as to give them the proper shape while in the canal, which will occasion much pain and irritation.

When the bougie is introduced, it is to be fastened, that it may not escape from the canal. For this purpose, various methods have been devised. The following is the one most used: two or three needles full of cotton are twisted together, and tied by the middle to the end of the bougie in a double knot; the two ends of the thread

are then carried above the gland, where they are united, also by a double knot, and then brought back to the end of the bougie, where they are again secured in the same manner. This kind of bridle has one disadvantage, that of compressing and strangulating the penis, during the frequent erections that take place under the use of these instruments. The same ligature has been fastened under the prepuce; but this has the additional inconvenience of irritating and even ulcerating the gland. Several kinds of elastic rings have been invented, all of them more or less complicated. I made one of my patients use a very ingenious apparatus. It consisted of a band of caoutchouc united at the extremities so as to form a ring, and of a cundum. After having introduced the bougie, he bent it half an inch from the end, so as to make it at a right angle with the orifice of the urethra. This hook being made, he covered the bougie and penis with the cundum, over which he slipped the gum-elastic ring. This contrivance possesses three advantages. 1st. The ring expands at the time of erection, and does not embarrass the penis: 2d. With the precaution of leaving two or three inches of the bougie beyond the penis, when the erection of the latter takes place, it extends along this portion of the instrument, and does not force out of the stricture that part of it which lies in the opening: 3rd. The matter of the discharge is received on a piece of soft linen, placed within the cundum, so that patients' clothes are not soiled. I constantly use the ring of caoutchouc. I fasten a thread to the extremity of the bougie, then bringing the ends, right and left, to the sides of the penis, over which I slide the ring, they are returned to the end of the instrument, and then made fast by a double knot.

The bougie being fixed by any of the foregoing methods, the patient wears it a longer or shorter time, according

to the degree of pain that it occasions. It is advisable not to leave it in the canal longer than half an hour, morning and evening, for the first few days. Afterwards, most practitioners do not withdraw it, except when the inclination to make water is very urgent, and replace it as soon as the patient has satisfied this want. Others do not remove it even at those times, if the patient can void his urine with it in his canal. In this case it is renewed only once a day, or perhaps only once every other day. The size of the bougies is increased gradually as the stricture is dilated, until one can be passed equal in diameter to the natural calibre of the canal.

This mode of treatment is not without its inconveniences and disadvantages.

1. It is uncertain, and, often, impracticable :
2. It is painful, and very tedious :
3. It is never more than palliative.

I. "It often happens," says Chopart, "that the introduction of bougies is so difficult that no dependence is to be placed upon them." There is not a practitioner who is not convinced of this truth, as there is not one, whatever may have been his skill, who has not failed in the introduction of these instruments. This arises from circumstances easily understood. I shall not speak of the folds and lacunæ of the urethra, in which the bougies are often caught, and which constitute obstacles only to those who want that knowledge which every man should possess, who undertakes the difficult task of treating the diseases of the urinary passages : difficulties of a more serious nature require our attention. It frequently happens that a band, a sort of membranous process, blocks up the canal almost entirely, so as to leave but a very small opening, which may be situated either wholly at its upper, or at its lower part : in such a case, the point of the bou-

gie cannot correspond with the opening, which is not in the axis of the canal; it strikes, therefore, against the centre of the stricture and bends. (See plate I. Fig. 1.) Again, the opening in the obstruction may be in the axis, but so small that the instrument cannot enter, and its point is reverted; sometimes it enters for the space of one or two lines, and then becomes so tightly wedged as to be unable to advance any further; if, in this situation, the pressure on the stricture be continued, it yields and coils up before the stricture, (Plate I. Fig. 2,) or else becomes twisted spirally. (Plate I. Fig. 3.)

It not unfrequently happens that after having cleared one stricture, we find a second, or even a third, which cannot be passed, and which therefore frustrates all that had been done. Nor does it rarely happen, that after having succeeded in passing an instrument into the bladder, we are unable to do it again for several days; for the stricture, irritated by the presence of the first bougie, inflames, swells, and thus becomes more sensible and narrower.

The small plaster bougies, to which we are obliged to have recourse at the beginning of treatment, yield very easily to a moderate degree of pressure, while the heat of the canal, by softening them, deprives them of their consistence; then, the slightest obstacle impedes them, and they are bent by the least violence, so that the most skilful operator may be deceived by the replication of the instrument, before the stricture, instead of its entrance into it. Thus, Chopart, supposing that he had passed an obstacle, because he had introduced the whole length of one of these bougies, was much surprised, a few hours after, to find both ends of the instrument appearing together at the orifice of the gland; he then perceived that it had bent in the middle, and turned round instead of penetrating the stricture. What we have now said sufficiently

proves that the introduction of bougies is uncertain, and often impracticable.

II. We have asserted that it is tedious and painful. The first introduction frequently occasions acute pain, rigors, cold sweats, and even syncope, if the instrument be not promptly withdrawn. This extreme sensibility of the canal lasts several days, and compels us to remove the bougie after a few minutes. Hunter has seen patients, who, for whole weeks, could not endure its presence more than eight or ten minutes a day. These, however, are rare cases; and most persons can wear a bougie half an hour, and some even a whole hour from the first day; the canal in time accommodates itself to the presence of these instruments, and they may be suffered to remain in it for a still longer period.

We are often obliged to withdraw the bougie on account of the micturition that it occasions, and from which the patient suffers a great deal. This inconvenience may be obviated by not introducing the bougie as far as the neck of the bladder, the irritation of which causes the peculiar sensation just mentioned. This precaution is not always sufficient to appease the desire to make water. There are individuals in whom these involuntary efforts of expulsion continue for days together, so long as they have a foreign body in the urethra. We must in such cases diminish this excessive sensibility by repeating the introduction oftener, and leaving the instrument in only a short time at once.

The irritation produced by bougies, causes in all persons erections of the penis, which are very distressing and painful, and which frequently compel us to remove the instrument sooner than would be, otherwise, desirable.

The presence of bougies soon determines, as we have already noticed, an inflammation of the mucous membrane

of the urethra, and consequently all the symptoms of gonorrhœa; a copious discharge, excessive sensibility of the canal, ardor urinæ, &c. which requires the antiphlogistic treatment, emollient applications, general and local bathing, repose in the horizontal posture, and suspension of the use of bougies, as long as may appear necessary.

In some cases the inflammation extends by continuity of tissue to the vesiculæ seminales, vasa-deferentia, and to one of the testicles, which becomes the seat of an inflammatory congestion. This affection is exceedingly painful, and requires the abandonment of bougies, often, for a considerable length of time.

A similar tumefaction may occur in the inguinal glands, and in like manner force us to suspend the use of these instruments.

It may also happen, especially when the patient walks with a bougie in his canal, that the inflammation extends to the cellular substance in the vicinity of the stricture; a tumour then appears at this place, and, if the instrument be not speedily withdrawn, or, if a decidedly antiphlogistic treatment be not immediately adopted, suppuration follows, and an abscess forms, which may be attended with all the dreadful consequences of an extravasation of urine.

Under the use of bougies, the most successful treatment, and that which is attended with the fewest inconveniences, is, yet, long, very exhausting, and requires great exertion; as, also, much patience and resignation on the part of the patient: "for three, six, nine months, and even a year, are sometimes necessary to the attainment of a suitable dilatation,"* and this dilatation never equals

* Richerand. Nosographic Chirurg. Vol. III. p. 507.

the natural calibre of the canal ; for, as we have already seen, the orifice of the urethra is not half so wide as the narrowest part of the rest of the canal, and a bougie has never been introduced of greater diameter than the meatus urinarius. Some practitioners have even proposed to enlarge the latter by an incision, in order to carry the dilatation farther ; but I do not know that this idea has ever been put in practice.

III. The greatest disadvantage attending the treatment with bougies, consists in its effecting only a palliative cure. We have an abundance of facts to prove that the retention soon returns if the use of bougies be not continued ; and that, without this precaution, the patient again suffers the same tortures, in the course of the first, or, at most, of the second year, when he is immediately compelled to introduce bougie after bougie to obtain a new cure for a few months. This great inconvenience has induced some surgeons, and particularly Stoll, to abandon entirely the use of bougies and catheters, as ineffectual means, without, however, proposing others of more efficiency. Those who pass their water freely, as was doubtless the case with Stoll, may readily adopt this conclusion ; but if he had ever been seized with retention of urine, he would have contented himself with deploring the insufficiency of bougies, and while ardently wishing to possess some more complete method of cure, he would not have disdained to empty his bladder with these, rather than not do it at all.

SECTION II.

Treatment with Catheters.

Catheters were used at a very early period ; and they have not undergone many modifications by time : for, with the difference of the metal, as Chopart observes, the catheters of the Romans differed little from those of the present day. These are described by Celsus. They were made of copper ; and their length varied from nine to fifteen finger-breadths. Silver catheters were afterwards nearly the only ones in use until the invention of those of gum-elastic. It was a long time believed that the catheters of the ancients had but one curve ; but in the researches made at Herculaneum, catheters have been found with two curves, closely resembling those of J. L. Petit. The use of these instruments was entirely lost, when observation, the basis of all useful inventions, suggested their utility to a surgeon of the last century, as it had before, to the original inventor.

J. L. Petit, perceiving that the presence of catheters with only one curve was very painful, and that when left in the canal for a certain time, they inflamed and ulcerated the anterior portion of the bladder, and the urethra itself at the foot of the penis, invented one with two curves in different directions, which gives the instrument the figure of an S, and adapts it better to the form of the canal. But the use of this kind of catheter has been abandoned, since the introduction of those of gum-elastic.

The anterior extremity, or point of the catheter, is generally perforated, laterally, with two holes, which are called its eyes. Some authors have asserted that the internal membrane of the urethra might be caught in these

apertures, which would render the introduction of the catheter more difficult and painful. To obviate this inconvenience, J. L. Petit had an instrument made, open at both extremities; a stylet, having a button at the end, closes the anterior extremity during its introduction; when the urine is to be drawn off, the stylet is drawn away, so that the button leaves the end of the catheter, and affords a space sufficient for the passage of the water. It is probably with a similar intention that catheters have been made, having the ends pierced with eight or ten holes. These catheters have certainly some advantage over the others, as regards their introduction; but the apertures, being very small, are more apt to be stopped by the mucus and blood.

The rigidity of metallic catheters rendering their presence in the canal extremely painful, and their continuance there dangerous, attempts have long been made to invent a kind that should be flexible. Van Helmont proposed to have such fabricated of thin leather and glue, and to introduce them by means of a stylet of whalebone. But the leather being penetrated by the urine and humidity of the canal, at the same time that the glue became soft, the instrument was found useless. Fabricius, of Aquapendens, conceived the idea of making them of horn; this was accomplished with some difficulty; but these catheters were almost as inflexible as those of silver, while they lacked the polish and solidity of the latter.

Tolet relates that he saw in Paris, in 1680, very smooth flexible catheters, made of flattened silver wire wound spirally. They had a suitable curvature given them by means of a stylet; but then the evenness of the wire was destroyed; the turns being crowded upon one another at the concave part of the curve, while they were drawn asunder at its convexity. These instruments, therefore,

would not answer. More recently the silver wire has been covered with the kind of leather used by gold beaters, which, in its turn, was coated with wax. Lastly, parchment has been employed, which was covered with silk thread, wound round it spirally, on which was spread wax and Nuremburgh plaster. These catheters thus improved, were sufficiently solid, and might be employed a number of times.

Macquer, having discovered a process for dissolving the substance called caoutchouc, or gum-elastic, was the first to suggest the idea that it might be useful in the manufacture of catheters. He accordingly proposed to cover a mould of wax with successive layers of caoutchouc in solution, so as to form a tube of a certain thickness, and having dried it, to remove the wax by means of boiling water. I do not know whether this process has been tried or not.

Bernard, a goldsmith at Paris, improved the idea of Macquer. He first made catheters with very fine silver thread, wound spirally, and covered longitudinally with silk, which was coated with melted caoutchouc. He soon abandoned this method for one much superior. It consists in covering a cylindrical roll of silk with a coat of a certain composition, of which caoutchouc is an ingredient. Catheters made in this manner are perfectly smooth and elastic, accommodate themselves readily to the curvatures of the canal, and are very solid, when well manufactured. Indeed, we may facilitate the introduction of these instruments by giving them a proper flexure, and their firmness may be increased at pleasure, by passing into them a stylet of copper, iron, or lead.

Sir Everard Home endeavoured for fifteen years to discover a method by which elastic catheters might receive a permanent curvature; so that they might be in-

roduced without a stylet; and he at length met with a workman in London who overcame the difficulty. I bespoke some of these catheters of M. Lasserre, an excellent manufacturer of gum-elastic instruments, and he succeeded completely at the first trial. He has them now for sale at his house Cloister Notre Dame, No. 4, of an excellent quality.*

A catheter is introduced, under or over the abdomen: the former method constitutes what is called the *tour de maitre*. It differs from the latter only in this--that the instrument is insinuated by directing the concave part of the curvature downwards, until it arrive under the symphysis, and then making it describe a semicircle which throws its convexity upwards. This manœuvre, which appears to have been used by our predecessors for no other purpose than that of displaying their dexterity to the patient and bystanders, does but increase the pain and difficulty of the operation. Some surgeons have deemed it necessary, where the patients are very corpulent; but in such cases it would be preferable, and more easy, to incline the catheter to the groin of either side.

The patient may be sounded either in the erect or horizontal posture. When standing, he is directed to support himself against a bed, or to lean upon a couple of assistants. In this manner the operator may govern his movements with more precision, than when he stands up

* These catheters are very useful in all cases in which, though the canal be clear, it becomes necessary to evacuate the bladder artificially, as in paralysis of that organ. They have also a great advantage over all other catheters, in those cases which frequently occur, especially in old men, when the retention of urine is caused by a fungous tumour formed at the neck of the bladder, for here, our object is not to overcome, but to shun the obstacle; and curved gum-elastic catheters are very proper for this purpose.

and bends as he must do to sound a patient on the bed, particularly if the latter be low.

When the patient is to be sounded on the bed, he is to lie on its left edge when we wish to use the right hand, and, vice versa, for the other; the legs are to be bent and the thighs kept a moderate distance apart: the surgeon stands at the left of the patient, when using his right, and on his right for the left hand. Having oiled the catheter, it is to be held like a writing pen, introduced into the canal, and made to advance by pressing on it with one hand, while the penis is stretched upon it with the other.*

When we have arrived at the symphysis, the penis and the handle of the instrument must be slightly depressed, so as to give the latter a direction by which it may follow the curve described by the urethra, under the arch of the pubis, and enter the bladder. The stylet is next withdrawn, and the urine suffered to flow out. If it be desirable that the catheter should remain in the canal, it may be secured by the method mentioned at page 44; its anterior extremity may be closed by a little plug of soft wood, which must be removed, whenever the water is to be drawn off.

* "The great art of introducing the catheter, says Ledran, (*Treatise on operations*, p. 90,) is to make the hand which grips the penis, and that which holds the instrument, act in concert. For, if I may use the expression, there should be understanding between them; that *alternately* the catheter should be pressed into the penis, and the penis drawn up upon the catheter.

If *simultaneously* were substituted for *alternately*, which implies that one hand should be inactive while the other urges the instrument—the sentence would be correct. An English writer, after having rendered the passage literally, thought, probably, that he would improve upon the expression, by saying, "*the catheter is to be introduced by pulling on the penis, as a fisherman would worm his hook.*"

When the course through which the catheter is to pass is clear, the operation just described is easy for a surgeon of moderate skill or information ; but it is far otherwise with him, who has neither the habit nor the knowledge which alone can facilitate its accomplishment. Such a one strikes the pubis, or the bulb, and, by a useless pressure, makes rugæ in the urethra where none had existed naturally.

But the cases in which there are no obstacles except those occasioned by awkwardness or ignorance, are not those which should engage our attention here ; we must occupy ourselves in the consideration of the great subject of the introduction of the catheter in retention of urine from a stricture in the urethra. We must examine with the closest attention a question which nearly concerns the lives of many.

How shall we pass a catheter into a urethra strictured to such a degree as to suffer the urine to escape only drop by drop ; or even so much as not to allow a single particle to escape ? What dangers are to be apprehended from so delicate an operation ? What will be its probable consequences ?

Let us examine those cases, I will not say in which it is necessary, but in which the operation is usually performed.

We have already observed that there are cases in which the introduction of a bougie is impossible by any known means ; and which, therefore, could not be progressively dilated by their use. Nevertheless the retention is not complete, but the patient wishes to have something done for his relief. In France, a catheter is thrust into his bladder by main force ; in England, where just apprehensions are entertained of the consequences of the application of violence, the stricture is consumed by caustic.

In other instances the danger is imminent ; the bladder is excessively distended, and the coarctation such that not a single drop of urine can be voided. If a bougie can be passed beyond the stricture, (and we hope to show a method by which it can always be done,) and it be withdrawn so soon as the desire of making water shall become pressing, the patient makes great efforts to discharge it, and a stream of urine issues when the bougie leaves the stricture. It is yet customary to have recourse to the catheter in this case.

Finally, to many practitioners, particularly those who aspire to the name of operators, the gradual progress, the minute and unwearied attention required in the treatment with bougies, when the patient cannot introduce them for himself, appear quite foreign to their *business*. They must have prompt means, efficient means, and, certes, the forcible introduction of the catheter is such. To introduce a silver catheter, to replace it by one of gum-elastic in two or three days, and to change the latter every eight or ten days ;—this they call practising on scientific principles, on a liberal and extensive plan. Why should we concern ourselves about the result ? What matters it, whether in a determinate number of cases a false passage have been, in a certain proportion, the necessary consequence of the forcible introduction of the catheter ; or that inflammation about the urethra and in the prostate gland, be equally the effect of the uninterrupted presence of these instruments in the canal ?

The operation which we are now examining is performed in two ways : either with a very firm catheter of the size of those used for infants ; or with one of a conical form, almost tapering to a point. Either of these instruments being introduced into the urethra, all the obstacles that are met with, are overthrown by main force. This

operation is certainly one of the most difficult in surgery ; it requires much talent and address, but the greatest skill in the world cannot free it of danger.

Without having any precise anatomical knowledge of strictures in the urethra, any one may readily form an idea, from reason and analogy, of the smallness of their calibre : attend, on the one hand, to the force with which the bladder, aided by the abdominal muscles, propels the urine ; and, on the other, to the tenuity of the stream, which is often less a stream than an interrupted succession of drops, and it will easily be conceived that the opening in a stricture must be small. But if we compare the small diameter of the orifice of an injecting syringe, or of a child's syringe, with the size of the stream of water in stricture, we shall be forced to admit, that the opening in the latter must be extremely minute, and that the aperture in a child's syringe is larger than that of a stricture. Consider in the next place, with respect to the introduction of the catheter, that the point of the instrument must pass this entrance before it can reach the bladder. But how shall it pass ? By dilating it ? In order to do so it must enter it, and for this there is too great a disproportion between its diameter and that of the stricture. It can penetrate beyond the stricture therefore, only by breaking through it. This truth being admitted, we have now to inquire whether the instrument can be directed with precision upon the point to be ruptured, and whether this part will offer less resistance than those in its vicinity.

We are told with an air of assurance, in most works on retention of urine, that commonly it is only by using great violence that these obstacles can be surmounted : for this purpose we must select a very unyielding catheter, so that it may not bend, but which must not be larger than a child's catheter ; sometimes, notwithstanding the smallness

of the instrument, it will not enter ; in such a case it must be rotated on its axis like a whimble, and if this will not make it advance, the palm of the hand is to be applied to the handle, and the catheter is to be thrust forward with force ; *but in the direction of the canal, parallel to its axis ; so long as pressure is made in this direction, it is impossible to deviate, it is impossible to force an unnatural passage.*

To press in the axis of the canal, is a precept very easily given to the pupil, and the latter finds it a very convenient answer at examination. But after leaving college, he is called to a man who cannot make water on account of one or more strictures in the urethra. Our young Doctor equips himself with a catheter, and calling to mind his principles, says he, " I have only to press in a direction parallel to the axis—but how shall I set about it ?" He then sees, for the first time, that the object has been indicated without the means of attaining it. In fact the precepts which he has received on this subject are not correct.

In the first place, is the curve described by the author always the same ? Does it not vary in different individuals ? Does it not differ in the same person according as the bladder is more or less distended ? " The urethra," says Chopart, " where it passes under the ossa pubis, has not the same curvature in all subjects. This diversity depends ; 1, on the angle formed by the arch of the pubis ; 2, on the fact, that at the symphysis the bones project externally to a certain degree, and consequently leave a greater or less space between the symphysis and the sacrum." Indeed nothing is less uniform than the curvature of the urethra : it varies with every individual, it differs in the same person, in proportion to the distention of the bladder ; when this is great, the neck is pushed forward, and, of

course, the flexure is greater than it would be in a state of vacuity.

But, have any attempts been made to ascertain the form of this curve, and make it a source of practical induction? Has the following observation ever been made—at such a distance from the orifice of the urethra commences the curvature of the canal; and, therefore, when the catheter shall have traversed such a space, it will be necessary to raise the point of the instrument so much, in order that it may follow the curvature of the passage? At least, nothing of the kind has ever been distinctly inculcated; and the only direction has been, to “follow one’s nose,” or, in other words, it has been said, that the *urethra would guide the catheter*; but when an obstacle impedes it, the hand of the operator must guide, and by what rule shall this be done? The canal is four lines in diameter; here we have a narrow part, on the centre of which the point of the instrument is to act; being obliged to make considerable pressure, if you pass outside of these four lines, you depress and perforate the coats of the urethra;—you force a wrong passage.

The obstruction forms in the canal a kind of sack, on the bottom of which the catheter is to be pressed. If this point offer less resistance than the sides, it yields, and the catheter pursues the proper route; this takes place in case of a simple band, which fortunately is the kind that occurs most frequently, and the texture of which is less firm and resisting than the coats of the urethra. But if, on the contrary, the latter resist less than the stricture, which happens whenever there is induration, the point of the instrument slides over the obstacle, depresses and perforates the canal.

Such are the difficulties which attend the introduction of the catheter when there is but one obstruction; but

when there are two or more, the difficulty is greatly increased ; the catheter being compressed by the first stricture, it is not half so easy to direct its course so as to clear the second, much less the third, or the fourth, should such a number be found.

An important question here presents itself : is it possible when impeded, after having cleared the first obstacle, to determine whether the progress of the catheter be opposed by another, or by the flesh, into which it may have forced a passage ? The catheter is twice checked in its advancement ; one obstacle presents anteriorly, the other laterally, or, if you please, one at the point, the other at the circumference. If the extremity be of the same dimensions as the rest of the instrument, the resistance laterally must be very feeble, because the point makes a sufficient opening for the free passage of the remainder of the catheter ; consequently, the point having passed the obstruction, and finding the canal clear beyond it, the impediment to its progress ceases in front, and only that at the side remains, which being inconsiderable, the instrument suddenly advances with a sort of jerk, greater or less according to the distance between the two strictures. If the canal be perforated, or a false passage formed, the catheter continues to progress ; but as there is no vacancy in the parts, the resistance anteriorly is constantly felt, and the sort of spring, just mentioned, does not take place.

If the practitioner be rash enough to use a conical instrument, even this distinction fails. Then, the resistance anteriorly is indeed inconsiderable, but the lateral opposition is great. The point of the instrument passes the obstacle, but, as it is very small, and the part behind it much larger, the latter is almost always wedged tight ; it cannot advance but by enlarging the opening through

which it is to pass—in a word, it is no longer the point which is to open a passage for the body, but the body which is to force its way for itself. If the canal be perforated with such an instrument, its pointed extremity easily insinuates itself into the soft parts, and the resistance met with in forcing a wrong passage, is not much greater than which is experienced when we have the good fortune not to deviate from the right one.

If the reader would test the soundness of the conclusions I have drawn, with respect to the action of cylindrical and conical catheters, he may take two bodies of these shapes, for instance, a whole quill and a punch such as is used for piercing paper; let him stretch a piece of paper over a glass or any other vessel, and perforate it with the quill; so soon as the end of the latter shall have passed through, the remainder will easily follow; let the same sheet now be pierced with the punch, and it will be found that after the point has penetrated, it will still require considerable pressure to pass the body.

We may conclude, therefore, that the forcible introduction of the catheter is always a dangerous operation, even in the hands of the most skilful surgeon,* and that the degree of danger is proportioned to the number of the obstacles, and the form of the instrument.

* Desault, who had the reputation of the greatest skill and dexterity in the introduction of the catheter, and who has chiefly emboldened surgeons by his example to employ force for this purpose, deviated, like others, and even very widely from the axis of the canal. The following fact is a remarkable proof of it: it is related by M. Deschamps, to whom it was communicated by M. Garre. Being called in the year 1795 to a patient who had great difficulty in making water, he (M. Garre) was much surprised to find him make use of two chamber pots, the one to receive the urine which flowed by the usual course, and the other to catch that which was voided by the anus.

We may sum up the discussion of this subject in the four following propositions.

I. When there is nothing more than a simple band, the natural passage is generally followed.

II. There is danger of deviating from it when there are several of these.

III. There is the greatest danger of forcing a wrong passage when the obstacle or obstacles are indurated.

IV. The operation offers nothing but uncertainty and hazard, under the use of a conical catheter.

Who would imagine, from the few precautions which are taken to avoid the forcing of a wrong passage, that the perforation of the canal is one of the most dreadful accidents, and which puts the life of the patient in jeopardy whenever it gives rise to extravasation of urine? This perforation almost always takes place near the obstacle, whether the latter offer more resistance than the surrounding parts, or that the catheter, improperly directed, has pressed upon the urethra instead of the stricture. Sometimes the catheter forces itself a passage under the mucous membrane of the urethra; but most commonly it perforates the coats of the canal entirely, and passes more or less forward amidst the cellular tissue, sometimes

He learned from the patient, that in an attack of retention of urine, which he had suffered, Desault found great difficulty in passing the catheter, and therefore had had recourse to force, by which he succeeded in evacuating the bladder. There can be no doubt that in this case, the point of the instrument had perforated the mucous membrane of the urethra and the rectum, and afterwards passed through the intestine, again to enter the bladder above the prostate. Cases like this would appear very interesting to compare with the precept above inculcated—but, unfortunately, these are not the cases which usually embellish our journals. (Deschamps.)

Traité historique et dogmatique de l'opération de la taille. Vol. I. page 238.

towards the symphysis, but most frequently towards the rectum, and by introducing a finger up the intestine, the point of the catheter is easily felt through its coats, and occasionally within its cavity. In these various cases, the catheter produces laceration and contusion to a greater or less extent, according to the degree of force employed, and in several different directions. In short, if, after having been arrested by a stricture, the instrument perforate the urethra, it passes on, the surgeon believes he has overcome one obstacle and arrived at another, so that he continues his efforts in hopes of triumphing over this new difficulty; he withdraws the point of the catheter a little, elevates or depresses it; and, as the cellular tissue does not resist much, he makes another hole in it, and thus at every attempt until the bottom of the false passage is drilled with holes, and trituated by the point of the instrument. On other occasions a still greater degree of force is employed; the act of boring as with a whimble, is not scrupled at: equipped with a very strong catheter, the surgeon stands prepared to force his way through all opposition. The fingers alone are no longer sufficient for his purpose; he rests the palm of his hand on the handle of the instrument, and, pretending to be able in this manner to follow the axis of the canal, he charges home; his weapon penetrates to the neck of the bladder; the coats of the sack yield to repeated efforts; they are pierced at length, and the liquid streams apace.—Victory! but it is a transient triumph, for death soon overtakes the patient.

False passages, therefore, are more or less terrible, according to the following circumstances: if the urethra have been pierced anterior to the stricture, and the circumspect surgeon have attended to the sensation which he experienced when the catheter suddenly passed for-

ward, to the effusion of blood, and the pain of which the patient complained, and withdraw the instrument, the danger will not be imminent, the urine passing easily beyond the stricture, may glide over the fissure without entering it, and the false route may be closed by a cicatrice. But in order that this may take place, the canal must be left in repose for some time; whereas, it often happens (setting aside that itch for always doing something and applying instruments, which infects some operators) that the symptoms of retention are very urgent: the patient cannot void a drop of urine, and, notwithstanding, wo to him, if the catheter be again resorted to, the false passage will be widened and the disease aggravated. If, under such circumstances, a complete antiphlogistic treatment should not succeed, I should prefer, notwithstanding its inconveniences, to puncture the bladder, rather than incur the almost certain misfortune of an infiltration of urine.

This result is inevitable when the false passage is situated behind the stricture; the latter confines the urine, which, being compressed between it and the bladder, presses laterally, and thus rushes abundantly into the unnatural passage, penetrates from one mesh to another of the cellular substance to a considerable extent.

When the false route opens on this side of the obstruction, but the parts have been much bruised and lacerated, by repeated trials, urinary infiltration is almost inevitable; and Chopart has, in the following passage, given a very faithful picture of what then takes place: "Commonly the irritation of the parts lacerated extends to the prostate gland, neck of the bladder, rectum, testicles, and penis; an inflammatory swelling takes place which is combated with general remedies, while depositions of urine, or of pus, are formed. In the mean time the symptoms of re-

tention increase, and render it necessary to have recourse to the catheter, or some other means to evacuate the urine. If these be delayed, a gangrenous fissure forms behind the stricture, the urine escapes into the neighbouring parts, and very frequently the patient perishes, even before the formation of this fissure.”*

It also happens that, by the application of great force, the bottom of the bladder is perforated. Will it be believed that surgeons have carried the want of reflection so far as even to defend such a practice? “If, in these attempts *carried too far*,” say they, “a false passage be formed, and if, having pierced the prostate, the bladder be entered at any other part than at its neck, the case is yet less serious than are the consequences of puncture.” But what would be the event of such a feat? The author from whom the foregoing passage is quoted, does not trouble himself about it, and makes no attempt to compute what it would be. Let us endeavour to do it. Whenever a foreign body is forcibly thrust into any of our parts, it produces an acute pain, to which succeeds inflammation. For example, a thorn pierces the finger; the punctured spot becomes red, painful, and swollen; if the thorn be extracted immediately, these symptoms may disappear very speedily; but otherwise the redness and swelling continue to increase, the pain becomes more severe, and suppuration takes place. It is precisely the same with a catheter wedged in an unnatural passage; it acts like a large thorn, it occasions insupportable pain and violent fever; of course the instrument must be removed, which leaves in the bladder an opening through which the urine passes the more readily, as its natural

* Chopart. Vol. II. page 376.

course continues to be obstructed; this liquid, therefore, is effused in great quantities into the cellular tissue, an enormous abscess and the death of the patient are the consequences. If, notwithstanding the pain and fever, the catheter should be obstinately suffered to remain, the abscess still forms, the urine penetrates its cavity, and the scene terminates in the same catastrophe.

Such are the consequences which reason teaches us to expect from this operation, and the conclusions to which it leads are confirmed by experience. "Of all the facts collected on this subject," says Chopart, "there is but a solitary *one* from which we learn that the patient who has undergone this perforation, has survived it a few years; and even this old man remained subject to a difficulty of making water, and retention of urine. The other patients died a few days afterwards; one, indeed, lingered nearly a month. Charles Bell expresses himself, with respect to this occurrence, in a manner equally positive. "Or," says he, "it has broken into the substance of the prostate gland, and has made its way under the coats of the neck and lower part of the bladder. In the evening after this attempt, the patient suffers a severe paroxysm of shivering, like a man seized with an ague, and to-morrow he is in a high fever, he begins to ramble, to be delirious, and is lost."

We have been compelled to examine the question of the forcible introduction of the catheter and false routes, because it is a capital point in the subject of this work: it now remains for us to make known the course which is adopted after the instrument has been introduced into the bladder.

It is customary to leave the silver catheter, which is commonly used to clear strictures, in the canal for 36 or 48 hours, and then substitute one of gum-elastic; the

latter is suffered to remain five or six days, and is then succeeded by another somewhat larger, and so on, until it be possible to pass them of as large a size as the urethra will admit.

We have seen, when speaking of the treatment with bougies, that the invariable consequence of the presence of a foreign body is the inflammation of the canal. This inflammation is sometimes very violent during the treatment with the bougies, although the urethra is habituated to them, and the use of them is suspended for a season when the pain becomes too severe. The inflammation in question is always considerable in the treatment with catheters; because the first introduction of these instruments cannot be effected without injuring the canal more or less; because the instrument suffered to remain is much more rigid and irritating than a bougie; and, lastly, because the irritation produced by a catheter, is, like its presence, uninterrupted, whereas in the treatment with bougies, surgeons of discretion remove the instruments, at least for a time, in order to give the urethra some repose. But with catheters there is no rest; we begin by irritating, by bruising, and lacerating the canal in one or more points, at the very introduction of the instrument, and then, the same instrument, rigid and unyielding, is suffered to lie in close contact with the canal thus predisposed to inflammation; accordingly, such inflammation, announced by pains along the course of the canal, by tumefaction of the penis, and fever, is not long in making its appearance. These symptoms are mitigated by repose, emollient cataplasms, the semicupium, local and general bleeding, with diet, and mucilaginous diluent drinks; and the silver catheter is replaced by one of gum-elastic. The irritating cause is then less violent, and by the aid of antiphlogistic means the symptoms are usually subdued.

But in a certain number of cases, the proportion of which is by no means inconsiderable, swelling of the testicle is induced. It is owing to the same cause as that which occurs under the treatment with bougies, but it is more frequent in the cases now under consideration, as the cause of the irritation is more powerful and more permanent. The same may be said of the swelling of the inguinal glands.

Abscesses in the vicinity of the canal and of the prostate gland, are also a much more frequent complication of the treatment with catheters, than of that with bougies : and these are particularly to be apprehended, when the patient walks with a catheter in his urethra. It may easily be conceived that the inflammation seated in the latter, constantly aggravated by the presence of a foreign body, must acquire a great degree of intensity, and extend to the neighbouring parts, by the friction caused by the catheter in walking. A tumour then shows itself at the perineum, suppuration takes place, and the danger of an infiltration of urine and of urinary fistulæ is imminent. This point appears to be too important not to justify a moment's delay in its investigation, and we think it cannot be better illustrated than by the relation of the two only examples of the treatment with catheters given by Desault, in his *Treatise on the diseases of the urinary passages*, published by Bichat.

A man, 57 years of age, having had in his youth four attacks of gonorrhœa and hæmaturia, was admitted into the Hôtel Dieu, at Paris, to be treated for a retention of urine. Desault, with much labour, cleared two strictures with a middle sized catheter ; one of the strictures being situated at the root of the penis, and the other at the membranous portion of the urethra. A catheter with two curves was substituted for the first, and this last in-

strument was not removed until the eleventh day, to give place to one of gum-elastic. A very small quantity of muco-purulent issued from the canal. The patient walked about, and the catheter is said to have occasioned him scarcely any inconvenience during that exercise.

About the 20th day, however, a tumour appeared at the root of the penis, and the scrotum became the seat of an inflammatory congestion. The urine flowed freely through the catheter. Antiphlogistic remedies were exhibited both locally and generally, but the instrument was suffered to remain; the pain as well as the swelling in the scrotum subsided. But this was not the case with the root of the penis: the canal ruptured at the strictured part—the retention of a few drops of urine in the fissure caused an abscess—the tumefaction augmented, and four days afterward, fluctuation became very evident, the skin being red and attenuated. A large opening was made which discharged a quantity of pus mixed with urine; the wound gave issue to the contents of the tumour, and the urine, *notwithstanding the presence of the catheter*, continued to pass through it, but in a small quantity.

The enlargement of the scrotum remained nearly stationary until the 17th day; it then increased considerably, and terminated in an abscess.

All the precautions that could be employed could not prevent a certain portion of the urine, which escaped through the fissure, from infiltrating into the cellular substance of the scrotum, where it successively formed indurations, abscesses, and sinuses.

At length, *on the hundred and eighteenth day of the treatment, the fistula was much narrower*; but the cure was not completed until 50 days later, that is to say, after *a treatment of six months*.

This case is followed by another which presents an additional example of the fatal effects produced by the uninterrupted presence of a catheter in the canal. After having overcome two obstacles, a catheter was introduced with two curves, as in the preceding instance, and afterwards one of gum-elastic. Every thing went on smoothly at first, but the patient became melancholy and peevish; a tumour soon appeared at the seat of the stricture, fluctuation manifested itself, an opening was made, and a mixture of pus and urine was discharged. The consequence was a fistula which presented almost the same phenomena as in the preceding case, which was treated in the same manner, and which, with the exception of a few days in the time of the cure, had a similar termination.

These are the two only instances of cure by the treatment with catheters, related by the surgeon by whom this method was most highly extolled. I commit them to the contemplation of the reader; let him examine all the incidents which have complicated these painful modes of treatment—he will every where see inflammation, suppuration, and ulceration, excited by the continued presence of the catheter.

By not removing a catheter when an inflammatory congestion shows itself, we act contrary to the laws of irritability, and contrary to that precept founded on an immutable truth, *sublata causa, tollitur effectus*?. The sound produces an inflammatory congestion; remove the cause, take away the instrument, and you may hope for a resolution, and that an abscess which would otherwise follow, will not be formed; leave the catheter, the cause remains, the effect follows, and suppuration is the consequence. The first thing to be done, therefore, is to remove the catheter; the next is, to adopt the most rigid antiphlo-

gistic treatment, in order to subdue the inflammation. Should we not be able to effect this, and suppuration do take place, we must open the abscess early, so that it may not burst into the urethra, and thereby expose the patient to the danger of a urinary fistula, as happened in the two cases above cited.

I am aware that in recommending this plan I differ from Desault and Chopart, who direct the catheter to be left in the canal, and the abscesses to be abandoned to nature. The following are their reasons for this course: these abscesses opening into the urethra while the catheter remains in it, the urine flows through the instrument, and the pus between it and the coats of the urethra. This is not strictly true; for if the catheter be displaced, and the patient make water, the danger of infiltration will be great; and what ought to make us the more apprehensive of such an event is the fact, that *when the patient feels a strong inclination to void his urine, after he has worn a catheter some time, the urine passes between the catheter and the canal*, and may therefore enter the cavity of the abscess. This is the more to be feared as the eyes of the catheter are frequently obstructed by mucus, and as we are obliged to pass an instrument which does not completely fill the urethra, otherwise the pus could not escape. Accordingly, Chopart is far from asserting positively that the urine will not make its way into the purulent cavity. The catheter which is in the canal, and which affords a passage for the urine, *generally* prevents its entering the abscess.

Infiltration of urine is so terrible a complication, that we cannot be justified in adopting a measure which will only prevent it generally, when we may have recourse to one which will always prevent it—I mean a seasonable incision.

The next reason assigned by the distinguished surgeons above named, for leaving these abscesses to nature, is the fact that one of them, Desault, has seen abscesses of this kind of considerable size, terminate gradually by resorption, and the patients have recovered without any other remedy than the catheter. But such a termination can be considered only a very rare occurrence, a lucky chance; and I desire no better proof of it than this, that Chopart, whose practice was very extensive, has never met with such a case; for he adduces, in evidence, the facts observed by Desault, without producing any of his own.

The continued presence of catheters in the canal has been seen to produce ulceration to a considerable extent in the canal, and even sometimes completely to destroy it for several inches. Charles Bell has observed many cases of this kind, and particularly one in which the destruction commenced about five inches from the orifice of the glans, and terminated in the neck of the bladder.

We may conclude, therefore, from what has been said, that the treatment with catheters is more painful and dangerous than that with bougies, in common with which, it has this radical disadvantage of producing only a palliative cure. Indeed, the dilatation procured by catheters, is neither greater nor more permanent than that effected with bougies.

SECTION III.

Of Puncturing the Bladder.

We have seen, in the preceding section, that there are cases in which it is impossible to evacuate the urine either with catheters or with bougies. The condition of the patient, under such circumstances, is extremely critical, and his life in immediate danger. Art affords yet one resource in this miserable predicament, which is to thrust a trocar through the integuments into the bladder, and thus form a new passage through which the urine may be freely discharged. This operation is called *paracentesis of the bladder*.

It is difficult to determine precisely the time at which the operation ought to be performed. Generally when a patient has not made water for 15 or 20 hours, if the severest antiphlogistic treatment have been pursued, and all attempts to evacuate the urine with bougies and catheters have proved ineffectual, the bladder must be punctured; it is the only remaining means of safety. If this be neglected, a rupture of the urethra behind the stricture will be the consequence, and the patient will sink under an overwhelming extravasation of urine. There are three different modes of performing this operation; at the hypogastrium, at the perineum, and through the rectum.

Paracentesis at the Hypogastrium.—This is performed with a trocar 4 inches and a half in length, and two lines and a half in diameter, having a slight curve. The patient lying on the edge of his bed, the surgeon introduces the instrument immediately over the symphysis pubis, turning the concavity of the trocar

towards this part. Having pierced the bladder, he withdraws the stylet, and the urine flows out. He introduces in the silver canula, one of gum-elastic, having its extremity properly rounded, and having at its sides two elliptical apertures like a catheter. He pushes the two canulæ down to the bottom of the bladder, and secures them by means of a circular bandage with small slips. He then stops the orifice of the gum-elastic canula, which exactly fits the canula of silver. This operation is easily performed, and attended with little pain. It is almost impossible to miss the bladder, which, when distended, presses the perineum upward and backward. The patient voids his urine lying on his side. The canula should not be removed until the natural passage shall have been restored.

Paracentesis at the Perineum. The patient is directed to lie on a bed or table, with his legs and thighs bent, as in the operation for the stone. The operator, introducing the fore-finger of the left hand into the rectum, depresses the intestine, at the same time that an assistant makes slight pressure on the hypogastrium; a straight trocar from 6 to 7 inches in length, is pushed through the soft parts in the middle of the space which separates the anus from the tuberosity of the ischium, the instrument being directed from below upwards, and from behind forwards, piercing the integuments, cellular substance, levator ani muscle, and the lower part of the bladder near its neck. The canula is secured by means of a T bandage, and the same course is pursued as in the operation at the hypogastrium.

Paracentesis through the Rectum. The patient is to be placed as before: the surgeon introduces the first finger

of the left hand into the rectum, and, after having felt the tumour formed by the bladder, passes the trocar along his finger, its point being covered by the canula. Having reached the middle of the anterior part of the rectum, he pierces the intestines, and penetrates the bladder which corresponds to it, and is separated from it only by dense cellular tissue. The bladder is very easily reached in this way, as has been well demonstrated by Mr. Sanson, in his memoir, entitled, *Des moyens de parvenir a la vessie par le rectum*. Each of the three operations which we have briefly described, has its advocates, and, as Bichat observes, our choice may be supported by authority. It appears to me, however, that tapping at the hypogastrium merits the preference; because it is more easily performed, and particularly, because it is less difficult to prevent the canula from falling out of the bladder.

CHAPTER III.

TREATMENT BY DESTRUCTION OF PARTS.

THE treatment which we have been considering in the foregoing chapter, leaves those parts which constitute the stricture untouched, and only flattens them without reducing them to a level with the rest of the canal. The length of time required for this purpose, and the short duration of the relief it procures, is a continual source of dissatisfaction to both the surgeon and the patient; and it has been a subject of anxious inquiry with the former, whether the treatment might not be shortened and rendered more efficacious, by actually destroying the part which forms the stricture. The vast importance of such a result has engaged the attention of surgeons in all ages, and attempts have been made to realize it by men of the greatest celebrity. The task was difficult: the strictures being all at a considerable depth, how was it possible to come at them without doing greater or less injury to the rest of the canal, which might be attended with very dangerous consequences? How, in a word, could the destruction be confined exclusively to the part diseased? This great difficulty has occasioned some very keen disputes among members of the profession; but no one has ever doubted the excellence of the indication. On the contrary, it has been unanimously acknowledged that the most desirable object in the treatment of strictures in the urethra, is to destroy the parts of which they are formed; and these controversies have arisen only concerning the means of attaining it, and the improvement of the processes devised for this purpose. Two methods

have been adopted : the one consists in exciting an ulceration in the stricture by mechanical agents ; the other, in destroying its vitality, by such as act chemically.

SECTION I.

Treatment by Ulceration.

STRONG and continued pressure never fails to produce an ulceration in any part of the body. It has accordingly been supposed, that by subjecting the strictured portion of the urethra to a due degree of pressure, it would occasion ulceration in it, and consequently loss of substance. This pressure has been made in two different directions ; namely, from within outwards, and from before backwards. The first method consists in introducing with force a very strong bougie into the canal, in such a manner that it shall be tightly wedged in the stricture, and cause sufficient compression to ulcerate its sides. Besides its uncertainty, this method unites, in a high degree, all the disadvantages attending the treatment with bougies and catheters. In fact, if the latter, when proportioned to the size of the opening in the stricture, produce pain, inflammation, and abscesses, much more will they produce this effect when their bulk and rigidity is increased.

There are, as we have shown, strictures with so small an opening, that it is impossible to penetrate them with the finest bougie, consequently they cannot be subjected to the treatment in question. The pressure in such cases, is made from before backwards.

For this purpose, a large cylindrical bougie of great strength is employed ; it is introduced as far as the stricture, against which it is pressed with a certain degree of force, and firmly secured in this situation ; which, consid-

ering the mobility of the point of support, is no easy matter. It requires a long time to ulcerate a stricture in this manner; and before it can be effected, the pain and inflammation generally become so intense, as to render it necessary to discontinue the treatment. This plan is attended with a still greater disadvantage, that of causing a perforation of the canal; and Chopart, who, in imitation of Desault, has so much extolled the use of force in the introduction of the catheter, appears to have passed sentence on this operation in describing the evils which attend it:—"As the object is to produce a simple ulceration, the presence of the bougie alone is sufficient to occasion it by the pressure and irritation *at the stricture, the firmest part of the urethra*. This pressure must be gradual and moderate; if too great, or continued very long, it might prove injurious, and *perforate the canal on one side of the stricture*." This is most apt to occur when the stricture is situated at the bend of the urethra. Hunter, who observed it several times, prudently recommends the treatment to be suspended when the urine does not flow freely, after the bougie has slipped forward, for, in that case, the bougie may have deviated from the right passage; and, if this pressure be then continued, the instrument penetrates deeper and deeper into the soft parts, and finishes by perforating the rectum, as has been observed by the author just mentioned. This manner of treating strictures in the urethra, has been entirely abandoned; and we have said sufficient to prove that it was not without good reason.

SECTION II.

Treatment with Escharotics.

CAUSTIC substances have been employed in the treatment of strictures in the urethra, from time immemorial. Aldereto, Philippe, Amatus Lusinatus, Alphonso Ferri, who flourished four centuries ago, used them with much success to destroy what they called carnosities in the urethra. The escharotic which they employed, was composed of the following ingredients:—

R.	Verdigris	}	ā ā 3j
	Orpiment		
	Vitriol		
	Rock alum		

These substances were thrown into vinegar, and exposed to the heat of the sun in the height of summer; the mixture was triturated after the desiccation was complete, and again moistened with vinegar; after the lapse of a few days, an addition was made of

Litharge, 3ij.
Oil of Roses, 3iv.

and it was exposed to the action of heat until it acquired the proper consistence. This caustic composition was employed in the following manner:—a bougie made of wax and linen was introduced as far as the bladder, and left there some time; it was then withdrawn, and the mark made by the pressure of the stricture upon it, carefully noted; a certain quantity of wax was removed from this point, and the cavity thus formed filled with the escharotic. This being done, the bougie was oiled, and again introduced, if possible, to precisely the same distance as before, in order that the caustic might correspond with the strictured portion of the canal.

This method had two disadvantages: 1. The escharotic employed is of such a nature as would induce too much inflammation. 2. A wax bougie is too flexible an instrument, and too soft when heated, to allow of its being placed with precision, so that a given part of it shall correspond with a given point in the urethra; whence it follows that the caustic must often act before or beyond the stricture; before the stricture it would inflame and ulcerate the stricture to no purpose; beyond it, the same effect would be produced with the addition of an infiltration of urine.

Ambrose Paré, as we have shown, also attributed certain cases of retention of urine, to the obstruction of the urethra by carnosities which he proposed to *cut and comminute* with catheters and proper stylets, of which he has given a description, and afterwards to consume them with caustic. The apparatus which he used for this purpose, nearly resembled that afterwards employed by William Loiseau, as also that introduced still more lately by Hunter, which so highly excited the enthusiasm of the English surgeons. This contrivance of Paré consisted of a canula, open anteriorly, and of a small silver rod, having at one extremity a little plug of linen. The canula being introduced so that the opening corresponded with the carnosity, some escharotic powder was applied to the latter, by means of the linen roll, with which the rod of silver was furnished. The treatment was afterwards conducted with bougies of wax or lead. The caustic employed by Ambrose Paré, was composed of

Powdered Sabine	3ij.
Ochre,	} â â 3j.
Antimony,	
Prepared tutty,	

He also used another, which, he says, was employed by the surgeons of Montpellier in his time: this is the same

with that of which we gave the formula at page 80 William Loiseau successfully treated Henry IV. by a method very similar to that of Paré. He relates the case as follows: "I did not fail to repair to the King, at the time appointed by M. De la Riviere, with a powder that I had composed at Bergerac, and an instrument which I invented, made in the manner of a canula, to serve as a catheter to direct the medicine to the carnosity; which instrument M. De la Riviere highly approved of, as well as the powder, with which I consumed the said carnosity in ten or twelve days, and the ulcer was cicatrized in three weeks after. I composed an ointment of my powder, incorporated with fresh butter, which I applied through my canula, to the carnosity at bed time, having first caused his majesty to make water; and next morning, I used refrigerant injections, made sometimes with the trochus of Gordon, and sometimes with the white trochus of Rhazes, dissolved in infusions of plantain purslane, or bitter-sweet, according to the exigency of the case, and finally prepared tutty and prepared antimony, incorporated with fresh butter, or, with the pampholigos ointment, and album Rhasis applied with my canula, or a bougie, the end of which I armed with a plaster made of my powder; which I left in the canal at night, while the King was a bed; or else, instead of the said ointment, I used to leave in the penis a leaden catheter covered with ointment, or well rubbed with purified crude quicksilver; and, in five weeks the late king was, by the grace of God, entirely cured. Notwithstanding that, during all this time, my enemies and those who were envious of me, endeavoured to calumniate me whenever he had any exacerbation, which was not owing to his carnosity nor my remedies, but to some excess in which his majesty had indulged: and then, those who envied me, spread a rumour, even as

far as Paris, that I was the cause of the king's disorder, by my remedies and instruments: but the king, being assured of my fidelity, and knowing that it was owing to other causes, was graciously pleased to speak in my favour before M. the Duke de Bouillon and several others.*

J. Hunter rendered the use of the nitrate of silver very prevalent in England, in the treatment of strictures in the urethra. This escharotic, indeed, appears to be fitter for this purpose than any other. 1. It is solid and not easily soluble, which enables us to introduce it to parts deeply seated. 2. Its action is confined to the surface which it touches; and this arises from its not entering into combination with the parts that it affects, (like caustic potash,) and from its coagulating and rendering concrete the mucus and pus with which it comes in contact; so that this forms a pellicle of tolerable thickness, which serves as a barrier between the caustic and surrounding sound parts. This pellicle, which is of a whitish colour, is very apparent on the caustic when withdrawn from the urethra. 3. It destroys the parts without producing much inflammation in them; it is even capable of terminating obstinate cases of inflammation, as is exemplified in its daily application in surgery.

The apparatus which Hunter first employed for the application of caustic, consisted of a silver canula, open at both ends, and a stylet of the same metal, having at one extremity a porte-crayon, and a button at the other. During the introduction the button closed the anterior opening of the canula exactly; and when it had reached the stricture the stylet was withdrawn, and that end which was armed with caustic introduced into the canula;

* *Observations Medicinales et Chirurgicales, &c.* Par M. G. Loyseau, p. 1. Bordeaux, 1617.

this was pressed against the stricture, where it was suffered to remain about a minute, and then drawn back into the sheath, and the whole apparatus removed. This operation was repeated every three or four days until the stricture was destroyed.*

* This method of cure did not originate with Hunter : its real author was Wiseman. Home relates the fact as follows : The idea of destroying strictures in the urethra with the nitrate of silver, was suggested by Wiseman more than a hundred years ago. "When the obstruction," says he, "is caused by a caruncula, and it cannot be passed, we must conclude that it is callous : in this case, a canula must be introduced into the urethra, until it rests upon the caruncula, a grain of caustic introduced through it, and pressed against the caruncula, where it is to be maintained, &c." Home adds, "He does not mention whether this practice was generally adopted in his time, or whether it were peculiar to himself ; he does not cite a single case in which it was tried."—Home's Treatise, vol. I. p. 125.

Home continues, erroneously, that this fact was not known to Hunter ; but in the translation of his work on the venereal disease, by Audiberti, we find the following remark : "Wiseman had the same idea, but the very rude manner in which he undertook to put it into execution, was probably the reason why he was not induced to persevere in it."—(Treatise of the Venereal Disease, by J. Hunter ; translated by Audiberti. 8vo. Paris, 1787, page 136.) I see nothing more rude in the method of Wiseman than in that of Hunter. The latter introduced a large piece of caustic, by means of a canula and stylet ; the former, by the same means, applied a small piece, and introduced it only when indispensable. Hunter evinces but little erudition on the subject of the use of escharotics in the treatment of retention of urine, when he says, speaking of his attendance on a person who had a stricture in the urethra—"I made use of bougies, but finding, at the end of six months, that I had made no progress by confining myself to them, I imagined that I should succeed better with escharotics ; and the first that I employed for this purpose was red precipitate. I covered the point of the bougie with ointment, and then dipped it into the red precipitate, after which I introduced it down to the stricture." (p. 136.) Notwithstanding that escharotic bougies have been known from time immemorial, he here adds in a note, "In reading lately some authors who have treated of this disease, I find that the idea is not new."

This method is attended with serious inconveniences : the silver canula being inflexible, cannot adapt itself to the sinuosities of the canal, and, most frequently, its interior opening does not strike exactly in front of the stricture, but on some part of the coats of the urethra ; so that the caustic acting upon that point, destroys it instead of the stricture, and a false passage is formed. Besides, the caustic sometimes destroys a part of the stricture, and forms a new channel, which is not in the direction of the canal : in this case, the stream of urine increases in size, but a bougie cannot be passed into the bladder. Hunter himself having perceived the disadvantages we have pointed out, abandoned it, and had recourse to the *armed bougie*, which is yet much used in England, and on the use of which, Sir Everard Home, a relation of Hunter, has written, at different times, three large octavo volumes. This ponderous work is not so much a scientific treatise on retention of urine, caused by strictures in the urethra, as a collection of facts to demonstrate the effects of the application of the armed bougie to the urethra.

The *armed bougie* of Hunter is a plaster bougie, to one end of which is fastened a bit of the nitrate of silver. The bougie used for this purpose, would nearly fill the urethra without being squeezed by it : a small hole is made in the centre of its extremity, and a piece of the nitrate of silver introduced, the edges of which are covered by drawing over them the substance of which the bougie is composed, so that the anterior surface of the caustic is alone exposed. The armed bougies used by the English surgeons, are prepared by the manufacturers of common bougies. They form, with a proper instrument, a cavity at the end of the bougie, which is filled by a cylinder of the nitrate of silver, about as large as those contained in the porte-crayons of our pocket instruments ; this being

done, the bougie is finished off, care being taken to cover the escharotic at the sides, so that its anterior surface only shall be left bare. Hunter made use of the armed bougie only in cases where he could not pass the stricture with a common one. Everard Home uses them with less discretion, for he treats, almost indiscriminately, all strictures of the urethra by this method.

It is used in the following manner: a simple plaster bougie is introduced in the urethra, of the same size with that which is armed with caustic. When the obstacle is reached, a mark is made on its body with the nail, at the orifice of the canal; this bougie being withdrawn, it is compared with the other, on which a corresponding mark is also made, denoting the distance to be traversed by the instrument before it can arrive at the stricture. The armed bougie being oiled, is introduced, and pressed against the stricture; the resistance which is felt, and the situation of the mark, indicate its having reached the obstruction, with which it is kept in close contact, under moderate pressure, for some time, and then withdrawn. This operation is repeated every other day until the obstacle or obstacles be destroyed; which is known by the free passage of the preparatory bougie into the bladder. A large bougie is afterwards passed, and suffered to remain a few minutes every day, and the cure is then considered complete.

This is a simple mode of proceeding, truly! but, we must confess, not very creditable to the most enlightened of the arts. To introduce a piece of caustic, and thrust it forward, without knowing what parts are spared and what consumed, is a barbarous operation, unworthy the noble end of surgery, and which can reflect but little honour on the person who performs it. Let us not, however, dwell on this consideration, but impartially examine the advantages and inconveniences attendant upon this method.

The application of the armed bougie generally produces acute pain, which patients compare to that caused by the pressure of a large bougie or catheter upon the stricture; this pain is succeeded by a slight burning, which lasts from half an hour to an hour. The next day, or the day after, the urine carries off the eschars; sometimes the eschar will come away entire, in the form of a whitish lenticular pellicule, or it may pass in pieces imperceptibly. After the second or third application, a blennorrhœal discharge takes place, the canal becomes more sensible, and the urine in passing through it causes great pain; in a word, the patient experiences all the symptoms of gonorrhœa. The greater the severity of these symptoms, the more painful are the succeeding applications.

Four, eight, twelve, even twenty applications are necessary to destroy a stricture under ordinary circumstances. Some patients have undergone one, two, and even as many as *five* hundred touchings; and one case is related in which they were continued to the number of twelve hundred and fifty-eight.* As the stricture is touched only on its anterior surface, there can be no increase in the discharge of urine until its posterior extremity shall have been reached, after which it flows in full stream.

The cures effected by caustic are generally more permanent than those obtained by bougies or catheters: many patients have had no relapse for six, eight, or even ten years; and a considerable number have been radically cured. I am acquainted with a person in this place, who, having suffered a relapse several times after being treated with bougies, has never failed to pass his water freely since he underwent a treatment with caustic, eight years

* Home's Treatise, vol. III. p. 119

ago, in England. In other cases, the disease returns in one or two years. Sir Everard Home attributed these relapses to the stricture not having been entirely destroyed, by using an armed bougie with too small a bit of caustic : he would, therefore, have the instrument nearly fill the canal, and when the orifice of the glans is not large enough to admit it, he would apply the caustic to that part in order to enlarge it sufficiently.

Such are the advantages offered by the treatment with the armed bougie : they are great and undeniable. Let us now examine the inconveniences. We class these in the following manner :—

I. That part of the canal which is anterior to the stricture, is always cauterized, and sometimes destroyed.

II. Complete retention is to be apprehended.

III. There is danger of making a false passage.

IV. A formidable hæmorrhage may be occasioned.

V. The disease may return in a more terrible and intractable form.

Let us amplify these propositions :—

I. When empty, the sides of the urethra are applied to each other, and lie in contact throughout their whole extent ; if an instrument be introduced into this canal, it separates its parietes, and forces a passage for itself ; the anterior extremity of this instrument then inevitably touches the coats of the urethra ; the caustic, before reaching the stricture, passes in contact with that part of the canal which it previously traverses, and must produce some effect upon it. But it will be said, the caustic passes so rapidly, that it has no time to act. It acts feebly, perhaps, but, nevertheless, it does act ; and to be convinced of this truth, we have only to touch, for a very short space of time, any wound, or humid surface, with a piece of the nitrate of silver, and such surface will immediately be-

come white, and we shall have proof that it has been affected by the caustic. It is certain that a blennorrhœal discharge accompanies the treatment with the armed bougie; and the advocates for this method of treatment maintain, that this discharge proceeds from the ulceration which the caustic occasions at the strictured part of the urethra. It will be seen, at the close of this work, that the application of caustic upon this point produces no running; and the conclusion must be, that the armed bougie produces a greater or less effect upon the canal anterior to the stricture. The muco-purulent matter of which the discharge consists, being effused in greater or less quantity between the stricture and the orifice of the urethra, the armed bougie, in traversing this passage, pushes before it a part of this matter, which, during the operation, becomes impregnated with the caustic, and afterwards flows through the urethra, and constantly inflames it.

It is not uncommon, during a course of treatment with the armed bougie, to see pieces of a whitish membraniform substance issue from the canal: these fragments have different degrees of length, and have sometimes the form of a tube. A patient whom I attended, voided, in the course of a badly conducted treatment with the armed bougie, several of these membraniform tubes, which had the appearance of a toothpick, and which often adhered by one extremity to the canal; the urine agitating them as it flowed, for some time before they were detached. These productions are the eschars formed by the action of the caustic upon that part of the canal which lies between the meatus urinarius and the stricture. When these eschars are detached, the canal presents an extensive excoriation, and the urine, in passing through it, occasions a very painful scalding.

The anterior part of the urethra may be injured in a much more terrible manner, if the caustic fall off from the point of the armed bougie, and remain in the canal. The heedlessness of English surgeons in this particular is indeed surprising: how is it that they have not been able to discover a method by which the nitrate of silver might be fastened to the end of a bougie? It is not very difficult: and yet how imperfect is the expedient they have adopted for this purpose! In fact, when the bougie is softened by the temperature of the canal, the small quantity of wax which retains the caustic, has, in a great measure, lost its consistence, and can scarcely secure this active substance: besides, the humidity of the urethra may penetrate between the wax and the nitrate of silver, and dissolve a portion of the latter, which, being no longer compressed by its proper cavity, may escape during the application, and remain in the urethra.

This accident has occurred very frequently in England; and Sir Everard Home contemplates it with a coolness and a degree of indifference which to me is inconceivable: he considers it quite a trifling casualty; and when it happens, so far from being alarmed, he turns it to the account of his patient. For this purpose, he does not waste his time in trying to extract the bit of caustic, but introduces a bougie, and thrusts the nitrate of silver back towards the stricture, where he confines it, in order that its action may affect this part of the urethra. Neither this operation, nor the air of assurance assumed by Sir Everard Home, nor the three cases which he relates, can convince us of its propriety. A piece of the nitrate of silver, three or four lines in length, and at least two lines in diameter, may destroy half an inch square of soft parts, and consequently interrupt the continuity of the canal, give rise to an infiltration of urine, lay open the

corpora cavernosa, and cause a terrible hæmorrhage, and finally leave a hard, irregular cicatrix, which may form a very great impediment to the passage of the urine.

II. *Complete retention is to be apprehended.* One of the greatest defects in the mode of treatment under consideration, is that of not facilitating the passage of instruments into the bladder before its completion. The thickness of the obstacle is diminished without any increase in its opening; and if in such a state of things the application of the armed bougie produce inflammation, and a complete retention supervene, the introduction of the catheter will be more difficult even than under ordinary circumstances. Sir Everard Home has been frequently embarrassed by this complication, and even reduced to the necessity of tapping the bladder to evacuate the urine. He relates two cases of this kind.

III. *There is danger of making a false passage.* It is impossible to reach the bladder without instruments sufficiently flexible to accommodate themselves to the curvature of the canal, or, which at least have nearly the form of this curvature. A straight instrument cannot penetrate beyond five or six inches of the urethra;* a gum elastic catheter of middle size, without a curve, goes no further, unless it be in persons who have been previously sounded; a large plaster bougie without a curve, passes as far as the bladder, but it must be introduced slowly, and have time to soften and adapt itself to the curvature of the canal. If it be introduced too suddenly it will strike at the distance of five or six inches like a straight catheter, like which, also, it occasions pain. The conclusion from these

* See Note F.

facts is, that a straight inflexible instrument armed with caustic, and thrust into the urethra, would perforate the bottom of its curvature, and force itself a passage towards the rectum; that a gum elastic catheter, similarly armed, would have a great tendency to follow the same course, as would also a large plaster bougie, although perhaps in a less degree. Now, Home does not direct us to give the armed bougie a suitable curve, and it will be easily perceived that its application may be directed to the posterior part of the urethra, near the stricture, when the latter is near the curve. Whenever the caustic has deviated from the true route, the operator, still believing that he is acting upon the stricture, pursues his course, for there is no indication by which he can be enlightened as to this error, and, as a patient of Sir E. Home has judiciously remarked, *the application of the armed bougie is an operation performed in the dark, and the most skilful practitioner may fail in it.* For my part, when I consider the activity of the caustic employed, I am convinced that a false route has been made whenever it has been found necessary to make two three, or twelve hundred applications on the same subject. So great an abuse of so powerful a remedy is truly dreadful; and even admitting that, in such, no deviation has been made, which is not at all probable, the repeated passage of the caustic into the canal, must have disorganized it to such a degree, as to leave it no better than an artificial canal.

A false passage may be owing to another cause, which Sir Everard Home has pointed out with great candour.—“The armed bougie,” says he, “destroys the inferior portion of the part to which it is applied, sooner than the superior, because the caustic, being dissolved during the operation, falls upon the former. The lower part of the stricture then will be destroyed the first, and by continuing the use of the caustic, *the parietes of the urethra may be*

consumed too extensively, and a false passage formed under the natural one." This happens more especially in those cases in which it is necessary to make numerous applications to destroy the same stricture. A remarkable case of this kind will be found among those related at the end of this work. The patient applied to me with a false passage, yet of some extent, although it was twenty days since he ceased to submit to the introduction, not of the armed bougie, but of the armed catheter, for it was to the point of a gum elastic catheter that the caustic had been imprudently fixed.

IV. *Hæmorrhage.* During the treatment with the armed bougie, a considerable discharge of blood takes place from the urethra; this liquid issues in a continued stream, and the quantity thus evacuated amounts sometimes to several pints. The patient faints and remains in that state for a longer or shorter time, and appears to be on the point of losing his life with the rest of his blood; so copious a hæmorrhage could not happen without the corpora cavernosa having been opened by the caustic.

Sir Everard Home assures us that no individual ever sunk under this complication, which he considers as of little importance. The following fact will show how little he fears it, and how few precautions he takes to avoid it. "The caustic was applied to the stricture fourteen times, before the bougie could be made to pass beyond it; hæmorrhage came on, and was so considerable, that it rather lowered him. As the bougie did not pass easily, *the caustic was applied anew*, which caused a great deal of pain, but this soon subsided. After having passed an evening in a warm apartment, the patient walked home in the cold, the thermometer being below 30° Fahrenheit. This *imprudence* caused the hæmorrhage to return, which continued

several hours, and was followed by a complete retention of urine; the latter disappeared, as well as the hæmorrhage, in the course of the day." Truly, in this the imprudence was referable less to the patient than the physician, who could ulcerate anew a part from which a considerable hæmorrhage had just taken place. The result of such imprudent conduct could not have been doubted; a fresh hæmorrhage must have been the consequence.

The loss of blood is not the only disagreeable consequence of the accident in question; a part of this liquid ascends into the bladder, and there, mixed with the urine, forms a coagulum which it is very difficult to expel; hence arises a complete retention of urine, which is often very obstinate. Home, who considered hæmorrhage to be attended with so little danger, was well aware of this fact; and even made experiments to illustrate it. The result of these is, that on mixing warm blood and urine, these two liquids form a solid mass, or coagulum, at the end of a quarter of an hour; and that, by pouring fresh urine on this three times a day, it will not be dissolved under twenty days.

Home advises the patient to be kept perfectly quiet, and the hæmorrhage to be left to itself. He mentions a case in which the bladder was entirely filled with blood, because pressure had been made on the perineum, which had prevented this liquid from flowing freely through the urethra.

V. *The disease may return in a more terrible and intractable form.* When the cure of retention of urine does not require more than six, eight, or ten applications of the armed bougie, I am inclined to believe it complete; because the parts have not suffered a great loss of substance, and because the cicatrix will be neither very hard nor very extensive; but when twenty, thirty, forty, fifty, and

even more applications have been made, I am persuaded that the disease will appear in a more formidable shape, because a callous, unequal, inflexible cicatrix, will supply the place of the soft and pliant parietes of the canal. It is a fact well known in England, that the treatment of a stricture in the urethra, which has already undergone the application of the armed bougie, is much more difficult than that of any other stricture. The means employed to effect dilatation are powerless with respect to it, and the obstacle is so hard and extensive, as not to be overcome by the armed bougie.

After a course of treatment with caustic, strictures are sometimes met with of prodigious extent. I have treated one which was fifteen lines in length; on which the most powerful means of dilatation had failed to produce any other effect, than to occasion a complete retention of urine. It is probable, that those in whom this troublesome disease is met with, had had several strictures close to each other, before they underwent the treatment with caustic; and that the armed bougie being impeded in its progress, had destroyed more or less completely, all these strictures, from the first to the last.

Such are the disadvantages attending the treatment with the armed bougie: a view of the facts related by authors, and even by Sir Everard Home, establishes them incontrovertibly. I will conclude what relates to this method, by a succinct exposition of one of the cases related by this last author, and which unites most of the accidents which accompany the treatment with the armed bougie.

A man, aged 32 years, applied to Home to be treated for retention of urine: this surgeon found a stricture at the distance of three inches from the orifice of the glans. He destroyed it with the armed bougie, and found another

at about five inches and a half. He again applied the caustic, but after the second trial, the patient found himself unable to void a single drop of urine. An enema, containing 40 drops of the tincture of opium, was administered in the evening; 20 drops were taken in a potion, at midnight, and the same quantity at two o'clock in the morning. At seven o'clock, the patient not yet having made water, the symptoms becoming more urgent, and the introduction of any instrument whatever in the urethra, being impossible, paracentesis of the bladder was performed through the rectum. A great quantity of urine issued through the canula, the patient was relieved, and the symptoms abated.

The second day, a small quantity of urine passed through the urethra; the patient had a paroxysm of fever; the night of the third day was very restless; on the fourth, the armed bougie was again applied, and the canula causing pain, was removed. After the fifth application, the stricture was destroyed; a third was discovered at the distance of six inches and a half; the armed bougie was applied to it, "which," says the author, "caused a swelling at the perineum, that lasted several days, but without impeding the passage of the urine; the course of which, was not afterwards interrupted, although the last obstruction was not destroyed before the expiration of three months, notwithstanding, that during all that time, the armed bougie had been applied every two or three days."

In the mean while, the health of the patient had deteriorated to such a degree under this treatment, that it was found necessary to send him into the country, that he might regain strength sufficient to endure a continuation of it the next spring. But the patient did not return until the the month of October. "All his complaints," continues our author, "were greatly increased, particularly the efforts of expulsion, which were constant and excessive."

"The use of the armed bougie," adds Home, "evidently aggravated all the sufferings of the patient, without procuring the smallest advantage : the parts appeared to have acquired too much hardness to be at all affected by the caustic. In this belief, and having persevered in the use of caustic to the beginning of December, (two months, from 50 to 60 applications,) I took a strong metallic catheter, tapering at the end to a small point, and by means of the index finger introduced in the rectum, I endeavoured to direct its point into the stricture. This operation did not cause much pain, and for five or six hours the patient made water with less difficulty ; but the next day there was more mucus behind the stricture, (or rather more swelling and irritation,) and the urine was not evacuated with so much ease. This circumstance induced me to pass the catheter only every third day. This instrument never failed to produce relief for three or four hours, but the disorder did not abate.

On the 17th January, a dark spot appeared at the orifice of the urethra ; 18th, the perineum was much swollen, the spot spread on the glans, and assumed all the characters of a gangrenous eschar ; 19th, the tumefaction had extended to the penis ; four scarifications were made in the scrotum, through which urine escaped ; 20th, the patient desired to have his bladder punctured, and the operation was performed ; finally, fever and diarrhœa came on and never left the patient, who died on the 29th.

" On dissection, the kidneys were found in a healthy state ; the ureters were three times the natural size ; the bladder very much inflamed, indurated, and its parietes half an inch in thickness.

" The prostate was almost in its natural state ; the urethra, to about an inch in extent from the veru montanum, was extraordinarily large, and appeared to terminate in a

sac, the thickened and indurated sides of which resembled cartilage. By attentive examination, a small opening was discovered leading to a cavity or abscess, *which could be discovered only by dividing the indurated parts ; this cavity communicated at its inferior surface with the urethra*, which was gangrenous to its external orifice.

Although the author does not make the reflection, it is easy to perceive that this cavity, formed in the midst of the indurated parts, and communicating by a large opening with the anterior part of the urethra, was a false passage made by the armed bougie. The candour of the author who relates so great a failure in practice, cannot be too much commended, and in this respect Sir Everard Home is worthy of high praise. If in his first volume he has mentioned no other cases than those which recommend his method, he has communicated in his other two many results as deplorable as that of the case above quoted ; and whoever will read these two volumes with attention, will perceive how awful a responsibility rests upon the surgeon who employs the armed bougie.

Mr. Whately has proposed to substitute *caustic* bougies for the armed bougie. With about a quarter of a grain of the nitrate of silver, and a sufficiency of mucilage of gum arabic, he makes a paste which he applies upon the extremity and partly upon the shoulders of a common bougie. This paste, on drying, adheres strongly to the bougie, and in this state both are passed into the urethra, down to the stricture.* by this process there is no risk of leaving behind a large piece of caustic in the urethra. In other respects, it has all the disadvantages of the armed bougie.

* *An improved method of treating strictures in the urethra. By Thomas Whately, page 81.*

Mr. Whately uses it only when it is impossible to pass an instrument into the bladder. When he can clear the stricture he has recourse to another method, which we shall examine.

Treatment with Caustic Potass.—This mode of treatment consists in applying a given quantity of caustic potass within the very aperture of the stricture. For this purpose the latter is somewhat dilated, by means of small bougies; the caustic is afterwards applied in the following manner: A bougie is introduced into the urethra of such a size that it may enter the stricture and be a little compressed by it; when the point reaches the stricture, a mark is made on the bougie with the nail, about half an inch from the orifice of the glans. The bougie is then passed, and made to enter the stricture a small distance; it is immediately withdrawn, and a hole is made at its extremity and sides, of almost a line and a half in extent, with a large pin; in this hole is placed a bit of caustic potass, about half the size of a pin's head, and, without covering it entirely, a little wax is drawn over its edges so as to keep it in its place. The rest of the hole is filled with axunge, with which the caustic also is covered, so as to prevent its injuring the urethra before it arrives at the stricture.

The bougie is dipped in oil, and introduced rapidly; "when it has reached the anterior part of the obstacle," says Mr. Whately, "it is left in its place for some seconds, in order that the caustic may begin to dissolve; it is then pushed forward about a line and a half, and then suffered to rest again one or two seconds, after which it is again advanced until it be fastened in the stricture. The sensation then experienced by the operator, generally denotes

that the bougie has penetrated thus far; but he must immediately refer to the mark on the body of the bougie, as this mark ought to be very near the orifice of the urethra when the point of the bougie has entirely passed the stricture.

"When the bougie has cleared the obstacle," continues Whately, "it ought immediately to be withdrawn gently, as far as the anterior surface of the stricture; then be introduced into the latter a second time, very softly, and without stopping; and this manner is repeated three or four times before finishing the operation, which altogether requires about two minutes." The operation is repeated every seven days until the treatment be concluded.

This method of Mr. Whately appears to me totally defective: 1. The caustic which he uses acts more slowly than the nitrate of silver; it liquefies very easily, and, mixing with the oil, the grease, and the humours of the canal, it loses its force; besides, its action is not prompt, as its daily use in surgery sufficiently proves. The quantity of caustic is moreover too small.

These are the marks o o o used by Mr. Whately to designate the bulk of caustic potass to be employed. I have taken a bit of caustic of the size of the largest of these dots, and mixing it with a little lard and oil, and having moistened a small space on the surface of my arm, I applied it to the spot, and suffered it to remain five minutes. I felt no pain, and the skin of the spot which was the subject of the experiment, did not even change colour. I have repeated this experiment with potass purified with spirits of wine, and with the same result. It is then very probable, that in following the method proposed by Mr. Whately, the stricture is very slightly cauterized. Charles Bell mentions a case which proves it: he treated a stricture in the urethra with caustic potass, in a man who

died of a pulmonary affection ; he opened the body, and found no trace of the action of the caustic : No spot, no abrasion, no slough were to be seen ; the bridle of the stricture remained sharp and fine.*

2. *The operation is immethodical, and must often fail.* Mr. Whately applies the caustic with a plaster bougie, and when the bougie is softened by the heat of the canal, he would make it alternately enter and leave the stricture, by pushing it forward, and withdrawing it one or two lines : for this purpose he employs small bougies, so fine, that sometimes they scarcely afford sufficient surface for the hole which is to receive the caustic. Such a bougie, subject to the temperature of 32° Reaumur, loses its consistence and bends on the slightest pressure. Besides, can the stricture be always entered in time to prevent the complete solution of the caustic before that takes place ? Mr. Whately knows the contrary very well, for speaking of a particular case, he says, “ the bougie which contained the caustic, was too large to pass the obstruction, so that the whole of the caustic was expended in front of it.” It will be readily conceived that this must often be the case ; the solubility of caustic potass is well known ; now, when it shall have become partly melted, it will be very loose in the hole ; what then shall prevent it from escaping ? Even admitting that Mr. Whately could attain the end which he proposes, by his curative method, his treatment would be of a most dismal length ; he makes but one application a week.

* Ch. Bell's *Treatise*, p. 357.

CHAPTER IV.

OF THE MODIFIED TREATMENT.

WE are now acquainted with all the means which have been hitherto employed for the cure of strictures in the urethra, and we see that three therapeutic agents have been used for this purpose; viz. plaster bougies, catheters, and the armed bougie. With plaster bougies the treatment is long, painful, uncertain, and, in a word, productive only of a palliative cure. With catheters we have the pain and dangers of the first introduction, with the torture of suffering a hard irritating body to remain in the urethra day and night, for six weeks or two months; and from this mode of treatment, which is the most painful of any, we cannot obtain a radical cure. With the armed bougie we have to apprehend various diseases and complications; we do indeed sometimes effect a permanent cure, but sometimes, also, the disease returns in a more terrible form, and it may be justly said of this method of treatment, that it is playing at *double or quits*.

Will the healing art never be improved in this particular, and shall we always be obliged to introduce a catheter, or a bougie, into the urethra without a rule or guide, or blindly to apply to it a destructive agent? Let us not be discouraged at the unsuccessful efforts of our predecessors; let us escape from the old path of routine, and examine the subject in every point of view—perhaps we may be able to see it in a new light.

Let us commence by establishing the end to be attained; let us determine the true indications, and then endeavour

to fulfil them. What is to be done to obtain the radical cure of a stricture in the urethra? Must we merely dilate the strictured portion of the canal to a greater degree than has hitherto been practised, and reduce the morbid and sound parts to a level? In answering this indication, we shall have effected little towards a cure, if we did not destroy the morbid disposition of the parts; so long as this shall remain, the disease will have a constant tendency to return. Now, by instruments which merely dilate, we forcibly enlarge the strictured part, but leave its morbid organization untouched; this indication is therefore defective, and the treatment, in order to be complete, must, I think, be founded on the following twofold indication: *To destroy the morbid disposition of the parts which form the stricture, and to reduce them to a level with the rest of the canal.* Now, if we can destroy the parts which constitute the stricture, and obtain a small, flexible, elastic cicatrix, of the diameter of the canal in its healthy state, I think we may accomplish this object; we must, therefore, propose to destroy the stricture by consuming its substance, and obtain a cicatrix four lines in diameter.

SECTION I.

Of the destruction of Strictures, and of the means of effecting it with precision.

We may fulfil the first part of the above indication by means of caustic; for, in destroying the diseased parts, it also modifies their vitality; and one of the surest methods of diminishing the excessive or morbid sensibility of an inflamed part, is to apply to it an escharotic. Innumerable facts establish this truth. In fact, whenever an ulcer

is the seat of acute pain, and manifests no disposition to cicatrize, it is slightly cauterized ; the morbid sensibility ceases, and a cicatrix is soon formed ; if fungous, flabby granulations cover an ulcer, it is slightly cauterized with the nitrate of silver ; they are depressed and condensed ; and this is owing not so much to the loss of substance, as to a peculiar modification caused in the life of the part diseased. If an herpetic eruption cause extreme or even insupportable itching, it is slightly cauterized, and this symptom subsides. All these facts demonstrate incontrovertibly, that escharotics have a twofold effect upon diseased parts : by one they destroy these parts ; by the other they modify their action, and cause the morbid disposition by which they are affected to cease. We require both these effects in the treatment of strictures in the urethra ; for they present at the same time superfluity of parts and a modification of vitality, a well-defined morbid sensibility.

But these useful agents, it will be said, when applied in the treatment of strictures in the urethra, are productive of many inconveniences and dangers ; these inconveniences and dangers are not referable to the agents themselves, but to the manner in which they are employed. Caustic affects the urethra precisely in the same way as it does other parts of the body ; the only difference is this, that in other parts it is under our control, and its action may be confined at will, which has not yet been effected in the urethra ; and if we shall be able to accomplish this, it will then cease to be an exception.*

Caustic, to be employed as advantageously as possible to a stricture in the urethra, should come in contact with

* The most active escharotics are applied to organs much more sensible and delicate than the urethra ; as, for example, upon the eyes.

nothing but the stricture, and touch it from within outwards throughout its whole extent, affecting no other part than that which obstructs the passage of the urine. For instance, for the stricture represented in Plate I. fig. 4, the indication would be to cauterize the space comprised between the lines *a a*, from the centre to the circumference, without touching the sound parts of the canal *b c*. For the stricture represented by fig. 5, the indication would be to touch the passage *a a* superiorly, without affecting the corresponding side *d* and the canal *b c*; and in the same manner for the stricture, fig. 6. For this purpose it would be necessary, before attempting the application of the caustic, to ascertain exactly the situation of the point to be touched; thus, we should know that it would be necessary to touch equally every part of the stricture fig. 4; that we must touch only the upper side of the stricture fig. 5; and the lower side of that represented by fig. 6; that the first is to be touched to the extent of three lines, the second to two, and the third to that of one line only. Finally, after having ascertained these facts, we must have an operative method by which we may fulfil the indications which arise from them. I think that I have obtained these results.

It is important to determine with precision at what distance from the orifice of the glans, the stricture we propose to treat is situated. For this purpose the canal must be explored with a catheter of middle size, in order that it may pass readily through the sound parts of the urethra, and be arrested by the first strictured point that it encounters. It is customary to employ a plaster bougie on which a mark is made with the nail near the orifice of the glans. I make use of a hollow bougie of gum-elastic, of the size No. 6, on which are marked the divisions of a foot rule. On introducing this bougie, I always know

the distance to which it has penetrated the urethra ; and when it is stopped by a stricture I perceive immediately that such stricture is at the distance of so many inches and lines from the orifice, which I note down.

Having ascertained this point, I immediately proceed to the examination of another, which is the situation of the opening in the stricture. In order to do this, I take an impression of the stricture in wax, and I obtain in relief the form of its anterior extremity. For this purpose I make use of the following instrument, which I call an *exploring catheter*. I have catheters of the Nos. 8, 9, and 10, open at both ends, and marked with the divisions of the foot ; the anterior opening of these instruments must be about half the size of the other ; I take a bit of sewing silk, and having tied several knots in it, and dipped them in melted wax, I round off the wax in the manner represented in fig. 7, Plate I. By means of a bit of edging I pass the silk into the catheter, entering at the larger opening ; when it has reached the other opening, the bulb formed by the knots covered with wax is detained, while the silk passes on and forms at the extremity of the catheter, a pencil of fine downy threads, both soft and strong ; (see Plate I. fig. 8 ;) or else I pass the bit of flat silk through four little holes situated near the end of the instrument, and uniting them together in a knot, I afterwards spread them out in the form of a pencil. This pencil is soaked in a mixture composed of equal parts of yellow wax, diachylon, shoe-maker's wax, and resin ; I take a sufficient quantity of it to enable it when rounded off to equal the bulk of the catheter. I let this *moulding wax* grow cold, and, softening it between my fingers, roll it upon some hard polished surface. I cut this kind of bougie added to the gum-elastic canula, at about two lines from the extremity of the latter, and round off the wax

like the end of a catheter, (see Plate II. fig. I.) By this arrangement, the moulding wax, mingled with the filaments of silk, becomes incorporated with them, and cannot fall off. I introduce one of these catheters into the urethra, and after I have arrived at the stricture, I leave the instrument in its place for a few moments, in order that the wax may have time to grow warm and soften, when the catheter is pushed forward; the wax being thus *pressed* between the catheter and the stricture, fills all the sinuosities of the latter, enters its opening, and, in a word, is moulded according to its figure. (Plate II. fig. 6.) The catheter being completely withdrawn, I find at its extremity the form of the stricture. (Plate II. fig. 7.)

If the projection of wax *e e*, fig. 7, which has entered the stricture, be in the middle of the lump of the same material which terminates the catheter, I perceive that the projecting parts which constitute the stricture, are equally distributed around the opening, and that the whole circumference of the latter is to be cauterized. But if it be at the upper part that the projection to be destroyed is situated, at the lower side; if, on the contrary, it be at the inferior part, I know that the caustic must be directed to the upper portion, and in like manner of the sides. By this means I can always procure the shape of the stricture, and ascertain all the changes that it undergoes in the course of the treatment. In a word, I can ascertain as clearly what takes place in the stricture at the deepest part of the canal, as if it were exposed to my sight.

The application of the exploring catheter requires some precaution; the bit of moulding wax which terminates the instrument should not be more than two lines and a half in length, otherwise too great a quantity might enter the stricture and there remain. This would occasion no other inconvenience than the failure of the operation, and

the necessity of recommencing after the wax shall have been ejected with the urine. I met with this little accident several times before I had perfected this method, but, though I have employed it in the manner just described for more than a year, and during all that time a day has seldom passed without my having recourse to it, I have not left wax in the canal above six times. The exploring catheter must not be rudely or violently pushed; a moderate degree of pressure, but continued and steady, is all that is necessary. When an impression is to be taken at the depth of $5\frac{1}{2}$ inches, or more, it is often expedient to give the instrument a suitable curvature, by means of a stylet of lead, or, what is better, to procure gum-elastic catheters. The same wax may be repeatedly employed, restoring it, after every time that it is used, to its proper shape.

We have now acquired some useful information respecting the thickness of the stricture; we wish next to know its length, that is to say, its extent from before backwards. Every one who has introduced plaster bougies into a strictured urethra has perceived, upon withdrawing them, that they were marked with grooves of greater or less extent, caused by the pressure of the stricture. Thus we may judge of the length of a stricture by that of the groove formed upon a bougie which remained in the canal. On this principle I have small cylindrical bougies of gum-elastic, which I cover with moulding wax in the following manner: I take several filaments of flat silk, and soak them in this wax melted, then wind this silk, thickly coated with wax, round the bougie, and roll the latter between two polished bodies. A bougie thus prepared, being introduced into the canal, is suffered to remain there a few moments, and when withdrawn it bears a furrow, the extent of which denotes that of the stricture. (Plate II. fig. 2.)

This mode of determining the length of a stricture is applicable in those cases only in which the bougie can be made to traverse the obstruction; now we have seen, in the second chapter, that there are cases where this is impracticable, and we have examined the causes by which it is rendered so. Let us now see if we can surmount this difficulty which so often perplexes both practitioner and patient.

Having taken an impression of the stricture, we know whether its opening be in the middle, above, below, or at either side: we want, therefore, an instrument which will enable us to direct at will, the point of the bougie to the middle, upper, lower, or lateral part, in order that it may correspond with the aperture in the obstacle, and enter it.

To effect this, I make use of an instrument which I call a *conductor*. It consists of a gum-elastic catheter, of the size, No. 8 or 9, eight inches in length, open at both ends, and marked, like all my other instruments, with the divisions of the foot. (Pl. II. fig. 3.) I close the anterior extremity of this instrument, with a stopper of wax and silk, (Pl. II. fig. 4,) in order that the fluids in the urethra may not penetrate the interior of the conductor, and I mould this waxen stopper on the end of the catheter, so as to give it an uniformly rounded extremity. The instrument being oiled, is introduced down to the stricture, and the stopper is withdrawn. When the orifice of the stricture is in the centre, the canal forms, at the strictured part, a section of a cone, having at its apex the aperture through which the bougie is to pass. Now, my conductor also represents a section of a cone, open at its top, and the consequence is, that when the conductor is applied against the obstacle, its opening corresponds with that of the latter; so that a bougie necessarily enters the orifice of the stricture so soon as it has passed that of the conductor. (See Pl. II. fig. 8, and exp.) To this we may add, that the bougie

cannot vacillate in the conductor, and you may be certain that the introduction of a bougie by this method, is always very easy, when the opening in the stricture is at the centre.

When this opening is situated above, below, or at either side, the canal still represents in the strictured part, the section of a cone, but the opening is not at its summit; accordingly the opening of the conductor will not correspond with it, but with some solid part; the conductor, therefore, which I have just described, would not answer in this case. I then employ a conductor which has an eminence of a certain size at one of its sides, near its extremity. (Pl. II. fig. 5.) By this arrangement the orifice of the conductor is no longer in the middle of the instrument, but on one side. Having ascertained by the form of the impression, that the aperture in the stricture is situated at its upper part, I introduce the conductor, and turn downwards the eminence which it has at its extremity; the opening is thus turned upwards, and corresponds exactly with that of the obstacle, so that a bougie passing from the one, necessarily enters the other. (Pl. II. fig. 10.) If, on the contrary, the opening in the stricture be at the lower part, I direct the eminence in the conductor upwards; I turn it to the right when the aperture is at the left, and to the left when it is at the right; so that I direct at will the point of the bougie into the orifice of the stricture. We here perceive how just is the observation quoted by the learned and scientific reporter of the Royal Academy of Sciences, "*to be able to explore is a great part of the art*;" for the method of exploration above described, has reduced the introduction of bougies, formerly so uncertain and hazardous an operation, to a mathematical certainty.

The bougie introduced by the above method must be proportioned to the calibre of the stricture, in order

that it may pass through the latter without being too much squeezed in it. Having taken this precaution, *we must never employ force* to introduce a bougie, but it must be pressed gently, for here our object is not to overcome resistance. The conductor must not be pressed against the obstacle, because it would corrugate the soft parts, but be kept merely in contact with it. By following these rules I always succeed.

I usually employ bougies which are not much more than eighteen lines in length, (Pl. II. figs. 9 & 11,) and I fasten them strongly on a tube of gum-elastic, *Taille en biseau*, with waxed silk with which I form a bulb, that rests against the anterior opening of the conductor, which is less wide than its canal. On this tube of gum-elastic, or *porte-bougie*, I make two marks; one, which is at the entrance of the conductor when the bougie is about to pass out of it at the other end, indicates that the point of the instrument is in contact with the stricture; the other mark, about eighteen lines distant from the former, shows that the bougie has entered. When I wish to enlarge a stricture, I introduce, in the first place, a bougie with a well rounded point, or with one perhaps a little larger than the body of the instrument, in order that the latter may encounter no more resistance after the former has passed the obstacle. (Pl. II. fig. 9.) I immediately withdraw this bougie, and substitute another of similar dimensions as far as its middle; thence it increases in size to its other extremity. (Pl. II. fig. 11.) During the introduction this bougie passes easily, as far as its centre; when we have arrived at this point, resistance is felt; we may then press without fear of making a false passage, for the point of the bougie has traversed the obstacle, and the resistance met with is exercised upon the sides of the bougie, which distend the parietes of the stricture. I next secure the bougie and

the conductor, and suffer them to remain in the urethra for half an hour ; and if it appear necessary in the progress of the treatment, I repeat the operation the following day.

Thus, by employing this method, we can always introduce a bougie loaded with moulding wax into the stricture, and consequently obtain the furrow which indicates the length of the part to be destroyed. We may also procure this knowledge by means of an instrument which I am going to describe. This instrument consists of a gum-elastic canula of the size, No. 1, terminating anteriorly in a point formed of gold, six lines in length ; two moveable pieces, a line and a half in extent, make part of the little golden cylinder which terminates the instrument, and are fixed to its anterior extremity by two hinges ; these two moveable pieces are soldered at the other extremity to two small springs, which unite on a shaft, *mandrin*, which passes through the whole instrument, and exceeds it in length by two or three lines. Being thus constructed, when the moveable pieces are brought together, they form, with the rest of the instrument, a cylinder terminating in a rounded extremity, but, on pressing the shaft, these pieces are separated, and form at the end of the instrument an expansion or head two lines in diameter. In order to measure a stricture with this instrument, I introduce a conductor down to the obstacle, and pass the instrument in question beyond the latter, then pressing the shaft, the moveable pieces separate from the body of the instrument ; I then gently draw it towards me : the head is held by the posterior surface of the stricture, while the extremity of the conductor rests upon its anterior surface ; in this manner, the space comprehended between the extremity of the conductor and the head of the other instrument, indicates the extent of the stricture. A graduated scale, placed at that extremity of the

instrument which passes beyond the conductor, out of the penis, shows me at a glance the length of the obstacle. (Pl. III. fig. 1, and explanation.) I then withdraw the shaft; the moveable pieces come together, and I remove the instrument. I rarely employ this method of measuring the length of a stricture, for the other generally suffices.

We have now acquired that preliminary knowledge which is necessary to enable us to apply the caustic with precision. We know what parts are to be spared and what destroyed, and to what extent the latter must be effected; besides, we have enlarged the opening in the stricture, and, if we had an instrument fit for the purpose, we might at pleasure destroy the stricture throughout its whole extent, in touching from before backwards and from within outwards; we might, if necessary, cauterize it circularly, or confine the action of the caustic to a greater or less extent of its circumference. The application of the instrument I am about to describe, and which I shall call a *porte-caustic*, appears to me completely to unite all these advantages.

This instrument consists of a very pliable canula of gum-elastic, of the size No. 7 or 8, eight inches in length, (Pl. III. fig. 2.) and of a platina case or sheath eleven lines long, and of the same calibre as the gum-elastic tube. (Pl. III. fig. 3.) This sheath has *externally* one turn of a screw, by means of which it may be fitted to the gum-elastic tube, and be made continuous with it; at its other extremity is another screw, two lines and a half in length, on which is placed a little nut, (Pl. III. fig. 16.) rounded at its anterior extremity, and perforated in the middle to afford a passage for the central shaft of the instrument. The interior of the sheath presents, through one half of its circumference, two projecting ridges, which extend to its

extremity, leaving between them on each side, and at two points diametrically opposite, a vacant space, which forms a groove from top to bottom. A cylinder of platina, ten lines long and one in diameter, attached to a gum-elastic bougie eight inches and a half in length, which serves as a handle to it, (Pl. III. fig. 5.) completes the instrument. This cylinder of platina has, five lines from its anterior extremity, a pin which extends beyond it for a quarter of a line right and left. At the distance of half a line below this pin, there is a deep furrow three lines in length and nearly three quarters of a line in breadth; thus prepared, the shaft represented in Plate III. fig. 5, being introduced into the gum-elastic canula, and the platina sheath being firmly screwed on the tube, the extremity of the cylinder *b*, fig. 5, extends a little beyond that of the sheath *c*, fig. 4; and we have the instrument as represented by fig. 6. But if the shaft be pressed, the little cylinder of platina leaves the sheath, and the instrument appears as represented in Pl. III. fig. 7. When the groove *ff*, fig. 7, designed to contain the caustic, appears externally, its superior extremity is even with, and even somewhat covered by the sheath of platina, which terminates the gum-elastic tube. The platina nut being three lines in diameter, cannot enter the stricture, but rests upon its anterior surface, while the little cylinder of platina enters the opening of the same stricture, and applies to it three lines of caustic, which is directed at will, above, below, or laterally, and by means of which, consequently, we may cauterize a single point of the circumference, a greater or less extent of it, or even the whole, by giving certain motions to the instrument. Let us illustrate it by examples.

Let us suppose that we have ascertained, by exploring the canal, that there is at the depth of five inches, a stricture with its opening in the centre. The porte-caustic be-

ing oiled and screwed, is introduced into the canal; at the depth of five inches it meets with resistance, and the mark which indicates this distance is at the external orifice of the urethra. We then make the inner shaft describe a quarter of a circle, and push it forward; the cylinder, loaded with caustic, leaves its sheath, and enters the stricture. (See Plate III. fig. 8.) As it is necessary in this case to cauterize the latter on its whole circumference, the instrument is gently turned on its axis, at the same time that it is slightly pressed, so that it shall not leave the stricture; it has touched the latter in its whole extent from before backwards and from within outwards. When the eschar shall have separated, the canal will be found enlarged at the strictured point, in proportion to the thickness of the parts destroyed by the caustic. (Plate III. figs. 8, 9, 10 & 11. which represent the stricture after the second and third application. The dotted lines and the dark lines indicate the parts consumed by the caustic.)

If the projection which constitutes the stricture be situated at the upper part, we introduce the porte-caustic in the same manner; we direct the groove which contains the caustic upwards, and move the instrument from right to left, making it describe half a circle only.* In this manner the caustic destroys the upper part of the strictured portion without affecting the inferior. (Plate III. figs. 12, 13, 14 and 15.) If, on the contrary, the part to be destroyed be situated at the under side, the caustic is applied in this direction, and in like manner if it be found to the right or left.

The effects of caustic employed in this manner are really astonishing: on the very first day, the patient, without voiding his urine in a larger stream, experiences less

* See Note G.

pain in making water; and this is easily accounted for; the internal surface of the stricture, which possessed so much sensibility, is destroyed, and the urine, in traversing the obstacle, passes over a dead part instead of one that is very sensible and irritable. On the third day the eschar separates, and the patient, to his great surprise, makes water in a stream as large as a crow quill.* A second, or at farthest a third application is sufficient, in the majority of cases, to enable the patient to pass his urine with perfect freedom. The cases related in the following chapter will fully establish the reality of these facts.

The pain caused by the application of the porte-caustic, is scarcely greater than that occasioned by the introduction of a bougie, and if the patient be not apprized of what he is about to undergo, he generally discovers no difference between them. There is no inflammation produced by the application of the caustic; it is extremely seldom that a running takes place after it, and it not unfrequently diminishes that which previously existed. It is evident that a hæmorrhage cannot occur under this treatment, unless a great extent of parts be wantonly and unwarrantably destroyed; for those which are consumed are the most distant from the corpora cavernosa. It is impossible to make a false passage, because the instrument enters the opening in the stricture, and this is effected without any force. It is not possible to cauterize a sound part of the canal, for if the instrument should be opened before the cylinder containing the caustic had entered the stricture, the platina sheath would not rest upon its anterior surface, and on attempting any movement of rotation, it would slip forward and cover the caustic.

The following are the rules which I observe in the ap-

* See Note H.

plication of the porte-caustic : after the first application, I wait three days without doing any thing ; at the end of this period I take a new impression, by which I learn how much the opening in the stricture has been enlarged, and what parts yet project and remain to be destroyed. I then pass, in the usual way, a bougie proportioned to the diameter of the obstacle ; if this bougie pass into the bladder, I know there is but one stricture. I next repeat the application, directing the caustic to the most prominent parts. Three days afterwards a new impression is taken, and if the parts which form the stricture project very little, a bougie of the size No. 6 may be passed with ease. I then make no further application of the caustic, but commence the dilatation of the canal, by means hereafter to be described. If, on the contrary, the parts still project considerably, I proceed to a third application.

When there is a second stricture, I attack it in the same manner, so soon as a passage has been cleared down to it for the instrument ; and if there should be a third, I do not undertake its destruction before that of the first and second has been completed.

These second and third strictures are generally at the distance of six inches or six inches and a half from the external orifice. At the depth of six inches, we may use the porte-caustic I have described, because the curvature of the urethra thus far is inconsiderable ; but beyond this distance, we must have recourse to an instrument slightly modified.* That which I employ is attached to the end of a gum-elastic tube, having a slight curve at its extremity, and the two grooves which the platina sheath has in its interior surface, terminate in a point, two lines from

* See Note I.

the extremity of the sheath; so that on turning the shaft which supports the little cylinder containing the caustic, the latter is moved without turning the gum-elastic canula. The application of this instrument is performed in the same manner as that of the other, with this difference only—that when the caustic is in the stricture, it is directed to the right or left as may be required, by moving the inner shaft, while the canula of gum-elastic, and the platina sheath in which it terminates, remain motionless.

The extent of the application is proportioned to that of the stricture; but, in case the latter should be very long, instead of touching the whole of it at once, it is preferable to destroy it progressively, by different applications of two or three lines each.* Eschars longer than this might be ejected with difficulty, and even cause a complete obstruction of the canal at the strictured part; besides, very extensive applications might irritate and inflame the canal. I shall relate, at the close of this work, a remarkable case of this kind of obstruction; and it was only by proceeding with the caution which I have here recommended, that I succeeded in destroying, without any unpleasant consequences, a stricture eighteen lines in length.

When the opening in the stricture is wholly above, below, or at either side, it will be necessary to have a porte-caustic furnished with an eminence at the extremity. (Pl. III. fig. 12.) The common porte-caustic may answer for the second application.

The quantity of caustic expended each time, should not exceed the tenth of a grain. At the commencement of my practice, in performing this operation, I used a much greater quantity, and without any disagreeable consequences; but I have found that two or three applications

* See Note J

with the tenth of a grain, are sufficient to destroy a stricture, in the majority of cases; and we should always bear in mind, that the thinness and flexibility of the cicatrix will also be in an inverse ratio to the extent of the parts destroyed. Let not this principle, therefore, be forgotten, for the sake of despatch, or of abridging the duration of the treatment by a few days: the stricture must be destroyed, but with as little caustic as possible.

I fill the groove in the porte-caustic with the nitrate of silver, in the following manner: having removed all that remains from the last application, I place two little bits of the nitrate of silver in the groove, and, by means of a blowpipe, I apply the flame of a lamp under it; the caustic soon melts, and fills the groove exactly. The heat must not be raised too high, otherwise the substance would run over; the temperature should be sufficient to melt the nitrate of silver. If some parts of the caustic should rise above others, they may be reduced to a level with the rest by means of a pumice stone, or by any similar method. The groove in the porte-caustic holds nearly half a grain of the nitrate of silver; but by suffering the instrument to remain only a minute, not more than one-third of this is dissolved.

It is superfluous here to add, that it is improper, in any case, to employ force for the introduction of the caustic into the stricture: with the facility which we have acquired of passing bougies, it is far preferable to introduce them of considerable size and firmness two or three times, than hazard, by too much precipitation, the failure of our operation, on which depends the cure of the patient.

Caustic must never be applied while the canal is in a state of inflammation; for instance, after complete retention. Before having recourse to this remedy, we must subdue the inflammation by the usual antiphlogistic means.

Examples of this kind will be found among the cases related in the following chapter.

SECTION II.

Of the Means of obtaining a Cicatrix of the Calibre of the Canal, in its Natural State.

WHEN advanced thus far in the treatment, we have fulfilled the first part of the indication which we established; we have, by means of the nitrate of silver, destroyed the stricture through its extent, without touching the sound parts. We have now to accomplish the second object of the indication, which consists in obtaining a cicatrix of the calibre of the canal in its natural state, that is to say, four lines in diameter: for this purpose I employ two instruments, one of which I call a *dilator*, the other a *bellied bougie*.

I did not invent, but have only improved the dilator, and adapted it to the use for which it is designed. I am not certain who is entitled to the merit of having first suggested the idea of this instrument: it consists of a small oblong sack, which is introduced empty into the part to be dilated, and afterwards filled with air or water, in order powerfully to distend the parts upon which it is to act. Absyrtus, a Greek veterinary surgeon, employed, in his practice, a hog's bladder to reduce and support an inverted uterus. Since his time, a piece of intestine has been used as a remedy in prolapsus ani, to check hæmorrhages from the intestines in the human subject; and also for pessaries.* Finally, we find in the *Œuvres Chirurgi-*

* See *Histoire de la Chirurgie*, par Périlhe, vol. II.

cales of Desault, the following passage:—"There are even some also who have proposed to introduce into the canal, by means of a catheter, a piece of catgut, emptied and tied at one end, to be filled afterwards with air, in order to distend and enlarge the canal.* In this manner it was proposed to facilitate the extraction of a calculus from the urethra.

Mr. Arnott, an English surgeon, has revived this idea, and without quoting Desault, or whoever first proposed the remedy,† he intends to apply it in the treatment of strictures in the urethra. A piece of catgut is five lines in diameter, and the very smallest that I have been able to procure, were four lines and a half. Mr. Arnott is well aware that there might be great disadvantage attending the sudden dilatation of a strictured portion of the canal to a diameter of four lines and a half, making a circumference of nearly fourteen; and that the consequences might be very troublesome. He has, accordingly, graduated his dilators, by drawing over the catgut a sheath of ribbon, of the size that he wishes to give the dilator; and, in order to render the instrument more smooth, he covers this sheath with another piece of catgut: there are, therefore, three of these tubes, namely, two of catgut, and one of ribbon. These three tubes, when twisted, form a cord equal in thickness to a catheter No. 6. Mr. Arnott attaches them by one end to a silver rod, and by the other to a canula, either of the same metal, of lead, or of gum-elastic. This, altogether, makes an instrument as large as a catheter of

* *Œuvres Chirurgicales* de Desault, 3d edit. vol. III. p. 271.

† I make this remark, because Mr. Arnott was not ignorant of the above mentioned passage; for he has read the *Œuvres Chirurgicales* of Desault, and quotes them in the 9th page of the pamphlet which he published in 1821.

the size No. 8, and, moreover, one that is full of folds and inequalities. Now, the English surgeon would pass this instrument through a stricture in which we often cannot succeed in introducing the finest bougie. He certainly will never accomplish it, and if he persist in using his dilator, he must previously enlarge the canal by other means.

Nevertheless, the distention which this instrument would produce, if its introduction were easy, would be attended with two great advantages. 1. It would cause much less irritation than is produced by bougies and catheters; for, instead of acting from before backwards, in the manner of a wedge, the dilator would produce its effects from within outwards, in separating the parietes of the strictured part. 2. As this instrument may be introduced, of a small size, which may be increased at pleasure after its introduction, the stricture might thereby be dilated to the degree that should be judged necessary, and reduced to its primitive calibre. But, if no other kind of dilatation were employed in the treatment of strictures in the urethra, as Mr. Arnott has proposed, the cure obtained would be less complete than even that effected by bougies. For, as we have shown in the 2d chapter, the permanent pressure of the bougies dissipates the congestion of the parts which form the stricture; an effect which the transient action of the dilator could never produce. In our plan of cure, we have no need of the latter effect, because we have already destroyed the parts which were the seat of the congestion. The indication which remains for us to fulfil, is to cause the wound which occupies the place of the stricture, to be succeeded by a cicatrix having as great a diameter as that of the canal in its healthy state; and the dilator may be of great use to us in the accomplishment of this object. I have, therefore,

turned my attention to the improvement of this instrument, and, I believe, with success.

I usually employ three dilators: the first is three lines in diameter, the second nearly four, and the third four and a half. I make the first and second of the appendix vermiformis of the cæcum, and the third, with a bit of catgut; and, causing them to be prepared by a manufacturer of catgut, I measure them with a compass. Some of them are three lines in diameter at the apex, and there are others which, particularly at the base, are four lines across. I cover a little silver rod, which terminates in a bulb, with a piece of the appendix about twenty lines in length; the sack, formed by the intestines, is tightly drawn over the bulb of the rod, and fastened under it with silk, tied in a double knot. This being done, I pass the rod into a canula of the same metal, eight or nine inches in length, having, at its anterior extremity, a deep groove three lines long, and I fasten the loose end of the appendix to this groove, securely, with waxed silk. (Pl. IV. figs. 1 and 4.) The silver canula has at its other extremity a cap or button, furnished with one turn of a screw. The rod of silver above-mentioned, must project a little beyond this cap, (Pl. IV. fig. 2,) and not fill the cavity of the canula exactly; it should play freely within it, and on pressing the end to which the dilator is attached, the other ought to pass out beyond the cap. Thus, we have an instrument which, for the space of eighteen lines, is not longer than the second size of bougies when empty, and acquires a diameter of three lines when full. (Pl. IV. fig. 1, and explan.)

It is seldom that we can meet with a vermicular appendix four lines in diameter at the apex, though they are frequently of this size at the base. I take a piece of the intestine, of this calibre, to make the second dilator;

and as this does not terminate in a sack, like that employed for the first, I fasten it strongly with silk, for the space of three lines, to the end of the silver rod. After this, I turn back the piece of appendix upon the ligature just mentioned, and finish the second dilator like the first. The third kind is similarly prepared, but with a piece of catgut four lines and a half in diameter. (Pl. IV. figs. 2 and 3.)

These instruments are to be used as follows:—Mark upon the canula, with a little wax, the distance from the external orifice to the stricture, so that the middle of the sack of the dilator may correspond with the part to be distended, when the mark shall be at the orifice in the glans. The dilator, being moistened and dipped in oil, is to be introduced like a catheter. If the extremity of the dilator meet with any resistance, by which its progress is impeded, it will be immediately perceived by the silver shaft passing out beyond the cap. We must not then press with our fingers, or in any other manner, but withdraw the instrument, and change its direction. I always introduce my dilators without either pressing the rod, or fastening it so that it cannot slip back. I believe this mode of proceeding to be prudent, and I should consider as very reprehensible any other, having for its object the forcible introduction of these instruments. I again repeat it, and I think it cannot be too often reiterated, that the forcible introduction of instruments, in the treatment of strictures in the urethra, can never be other than pernicious.

When the dilator is introduced, I fit, by means of a screw, a syringe (Pl. IV. fig. 6,) furnished with a fawcet to the cap of the dilator, and I press on the piston gently until I meet with some resistance; I then turn the fawcet; the dilator is now distended, and separates the

parietes of the strictured portion from three to four lines. In about five minutes, for the first time, and afterwards from ten to fifteen, I open the sawcet, empty the instrument, and withdraw it.

For a long time I distended my dilators with air : I used then to have a good deal of trouble to make the dilatation permanent ; for it is very difficult, even with the greatest care, to prevent the air from escaping through some outlet. When this fluid is strongly compressed, it finds its way between the sawcet and little circular piece of leather which separates them. I have remedied this inconvenience, by filling the instrument in the following manner : I inject air into the dilator until I experience a slight resistance, and turn the sawcet ; I fill the syringe, and attaching it to the sawcet, the latter is opened, and the water thrown in upon the air ; the latter, strongly compressed by the column of water, becomes condensed ; the quantity of air which occupied the whole dilator, no longer fills more than half or one-third of it, the rest being occupied by the water. In this way, a much more powerful distention is produced, and if the dilator should leak, the compressed air would expand, and, supplying the deficiency, keep up the dilatation. Besides, it is then impossible for the air to escape through the sawcet and tent : for between these parts of the instrument and the place occupied by the air, is a column of water which the former cannot pass. In this manner the dilator is distended to its fullest extent, and may be kept in that state for a longer or shorter time. Hence, on opening the sawcet after a quarter of an hour, the air, recovering its natural density, throws to a distance a part of the water contained in the instrument—a proof that the latter was powerfully distended.

It is evident, that with the dilator alone it is possible to obtain a cicatrix four lines in diameter, or even greater, if it were required ; but as the distention pro-

duced by this instrument is not permanent, and requires to be frequently repeated, I find it easier and more advantageous to assist the dilatation with another instrument, which I have called a *bellied bougie*.

A blind attachment to established routine, characterizes the use of bougies and catheters in the treatment of strictures in the urethra; no regard is paid to the conformation or sensibility of the canal; neither of the situation, nor of the extent of the part to be enlarged; and with many a practitioner the whole treatment of a stricture in the urethra, is no more than putting a pin into a hole. We have seen in the first chapter, that the urethra is throughout its extent four lines in diameter, with the exception of the bulb and fossa navicularis, where it is wider, and the orifice of the glans where it is much more narrow, being in the latter not more than from two lines and a half to three lines in diameter. This, the narrowest point, is also the most sensible, which feels most acutely every impression of which the urethra is susceptible. In the second chapter we observed that the stricture which causes all the sufferings of the patient, is generally not more than one or two lines in extent. This limited space is all that it would be useful to dilate, and it is commonly at a considerable distance from the external orifice. Now let us see what takes place in the treatment by dilatation. At the present day, plaster bougies, even of the largest kind, are conical; whence it happens that the orifice of the canal, that is to say, the part which is naturally the smallest and most sensitive, which has no need of being dilated, is in contact with the largest part of the bougie, whilst the strictured portion, which ought to be dilated, is in contact with a part of the bougie of much less size; and if we measure these bougies with a wire-drawing iron, we shall find that the external orifice is distended by one of No. 12,

while the stricture five inches further on, is pressed by one of No. 8. The consequence is, that the orifice of the glans, and all that part of the urethra anterior to the stricture, is very violently stretched and irritated. I made these observations, some time ago, to one of the best manufacturers of plaster bougies in Paris : he replied, " I agree with you perfectly ; but if I made my bougies in any other way than the present, I should not be able to sell them—they are accustomed to use these."

Cylindrical catheters and bougies cause less inconvenience : when the part of the canal anterior to the stricture, is distended by a catheter or bougie of the size No. 12, the strictured portion is equally so. But here, again, the parts anterior to the stricture, are subject to a very considerable degree of irritation, to no purpose ; the external orifice particularly, being only two lines and a half in diameter, is greatly overstretched by a catheter which is three, and the consequence is extreme pain. Hence, catheters of the size No. 12 are seldom passed. The introduction of these instruments is also very difficult and painful ; for the external orifice, having its edges pressed back and thrown into irregular folds, compresses them tightly, and it is only by overcoming this resistance, that they can be made to advance.

Having perceived and deliberately weighed all these inconveniences, I devised a remedy : it consisted in procuring some bougies made with a protuberance, or belly, from twelve to fifteen lines in extent. I have bougies of this description, the bellies of which are of very different dimensions ; the shaft being in the smallest, like that of the largest, only two lines in diameter. The smallest bougies that I use, immediately after having destroyed the stricture with caustic, have a belly two lines and a half in diameter ; those next used, are three lines ; the next,

three and a half; and the last have a belly four lines in diameter. These bougies have three great advantages over all others. 1. The introduction of them is less difficult, and not so painful, as that of the other kinds. 2. They distend only the part strictured. 3. They can distend to the degree of four lines, (the natural calibre of the canal,) while the others do not dilate it above three lines. In order to illustrate the truth of these propositions, let us examine what takes place during the introduction and continuance of bellied bougies in the urethra.

Introduce a bougie having a belly two lines and a half in diameter; this is the natural size of the external orifice. When the belly passes this part, it fills without distending it, and the bougie enters without difficulty. Introduce a bougie with a belly three lines in diameter; this bougie, having a belly half a line larger than the orifice of the urethra, meets with some resistance in passing it; but when it has once cleared it, it enters a canal four lines in diameter. It has, therefore, one line to move freely in, and the rest of the bougie not filling the orifice, cannot meet with any resistance. When the belly reaches the strictured part, the latter comes in contact with a bougie of the size No. 12, while the rest of the canal contains only a No. 6, which can cause in it but a trifling irritation.

It is well known that our organs will endure a momentary distention to a considerable degree, without any danger: on this principle, we introduce a bougie with a belly three lines and a half in diameter. When the belly arrives at the orifice of the urethra, we meet with resistance; and as the parietes are very elastic and flexible, they yield, and the belly passes on; it then enters a canal that is four lines across, and as it is only three and a half, it advances easily. When it comes to the stricture, it distends it to three lines and a half, while the rest of the

canal contains a body but two lines in diameter. On introducing a bellied bougie of four lines, the natural size of the canal, the belly has to overcome greater resistance in traversing the orifice; but when it has reached the body of the canal, it exactly fills it, but without producing any distention; it passes with a slight resistance; and when it has reached the stricture, by distending it four lines, it reduces it to a level with the rest of the urethra, and, during this dilatation, the external orifice, and all that part between it and the obstacle, are in contact with a bougie two lines in diameter, by which it is neither rubbed nor irritated.

To resume the course of our treatment: three days after the last application of the nitrate of silver, I introduce a dilator three lines in diameter, inflated with air, and suffer it to remain five minutes; the next day I introduce the same dilator, distended as much as possible with air and water; in about ten minutes, I remove it, and put in its place a bellied bougie, two lines and a half in diameter, which the patient keeps there twenty minutes: the introduction of this bougie is repeated the next day, both morning and evening, and suffered to remain a similar time. The day after, I pass the second dilator, of nearly four lines diameter, and withdrawing it after ten minutes, its place is supplied by a bellied bougie three lines in diameter. This bougie is passed, morning and evening the next day, remaining in, each time, from ten to twenty minutes. A further dilatation is effected the next day with the same dilator; two days after, the third dilator is introduced, having a diameter of four lines and a half, and succeeded by a bellied bougie of three lines and a half. After another interval of two days, I again introduce this dilator, and pass a bellied bougie four lines in diameter, which is repeated morning and evening, remaining a quarter

of an hour. In the course of a week, the bougie is only introduced once a day, and retained but for a few minutes : in about four or five days, the patient himself passes it once a day, withdrawing it immediately.* The cicatrix, by this time, has become firmly consolidated, and is four lines in diameter, like the rest of the canal.

When the stricture has been properly destroyed by caustic, the dilatation of the part in which it was seated becomes very easy, and the course which I have described is readily pursued. The introduction of bellied bougies is attended with little pain; for the circumstances are arranged in such a manner, that even the largest of these bougies is always preceded by a dilator at least half a line more in diameter.

We have now attained the end that was proposed:—
 1. We have, by means of caustic, destroyed the stricture to the extent required, without doing any injury to the parts that were not diseased. 2. We have obtained a cicatrix equal in calibre to the rest of the canal; and we may consider the patient who has been thus treated, radically cured. This mode of treatment, therefore, possesses this great advantage—that it leads to a permanent cure, while all the others effect only a temporary alleviation. It offers also another, which is that of producing this great result more speedily, with less pain to the patient, and without exposing him to the dangers with which the other methods are attended. In short, in simple cases, after having taken an impression of the stricture, passed the bougie down to it, and made one application of the

* When we have arrived at this stage, it is desirable that the belly of the bougie should not be more than four or five lines in length, (Pl. IV. fig. 8.) so that the friction being less considerable, the introduction may be rendered easier.

caustic, the patient rests for three days, before the expiration of which he has already recovered the power of passing his water in a considerable stream. A new impression is then taken and another application made, after which the patient reposes again for three days; at the end of which his urine flows in natural abundance. A third application is commonly necessary; but we are rarely obliged to make a fourth: in such a case, the dilatation of the canal should be begun on the 12th instead of the 9th day of the treatment. Then a dilator is introduced every other day, and a bellied bougie every day: at the end of a week the strictured portion has resumed its wonted calibre, and admits a bougie with a belly of four lines—this bougie is retained only about twenty minutes;* after a while, it is merely introduced and withdrawn again: at first this is done every day, and then at longer intervals, until the cicatrix shall have acquired a suitable firmness, and the cure is completed. Let this kind of treatment be compared with that by bougies, catheters, or even the armed bougie; let the uncertainty, the dangers, the disorders which attend the latter be recollected; examine with due care the means which my method presents of obviating these inconveniences; finally, contrast the ultimate results of these curative processes, and decide.

* By leaving it longer, a degree of inflammation would be produced, not at all necessary to the cure.

SECTION III.

Of the Course to be pursued in Complete Retention, and in Urinary Fistulæ.

BEFORE adducing facts in confirmation of the efficacy of the curative method I have just described, I have yet to speak of those cases which are more or less frequently to be met with in practice; viz. complete retention, urinary fistulæ, and urinary fistulæ with complete obliteration of some point of the canal.

Complete retention of urine cannot continue any length of time without compromising the life of the sufferer: it must be combated, therefore, by prompt and efficient means. It is customary to relieve it by the forcible introduction of the catheter; but this operation, as we have already observed, is very painful and formidable, from the danger of perforating the canal, and causing a urinary infiltration. It is proved, that the introduction into the aperture in the stricture, ordinarily suffices to restore a passage to the urine; accordingly, when I am called to a patient who cannot make water at all, I adopt the following course:—I take a fine gum-elastic bougie, and introduce it gently into the urethra; if I succeed in making it pass through the obstacle, I suffer it to remain until a strong inclination to make water is felt, and then withdraw the instrument softly, and the urine rushes through the passage which had been occupied by the instrument, flowing in a stream. When the patient has voided as much urine as possible, I introduce the bougie again, and leave it until a fresh inclination to make water comes on. In the mean while I bleed

the patient, and apply twenty or thirty leeches to the anus and perineum, and prescribe a hip-bath, emollient anodyne clysters, rest, and abstinence.

If I cannot pass a bougie I use no force to thrust it in, but remove it. I take an impression of the stricture, and introduce a small bougie by means of a conductor;* this bougie is succeeded by one of greater size; when the inclination to make water is very urgent, I withdraw at once both bougie and conductor, and the stream flows. I have recourse afterwards to the above-mentioned antiphlogistic means, and when the inflammation of the canal has been subdued, I commence the radical treatment. This mode of proceeding has always succeeded with me, and I have never adopted any other since I have entertained the ideas suggested in this chapter. If, which is not probable, the bougie should fail to re-establish the course of urine, it will be necessary, after having passed the second bougie, to introduce, through a conductor, a small gum-elastic catheter into the bladder, and draw off the urine in this manner.

It is generally believed in France, that a urinary fistula cannot be cured without leaving a catheter in the urethra, which, by offering a passage to the urine, prevents its escaping through the fistulous opening. Everard Home relates many cases of urinary fistulæ cured by the application of the armed bougie alone.† Having thus destroyed the obstacle, and freely opened the natural channel, the urine flows through it, and ceases to percolate the fistulous passages, which soon become obliterated. Thus, instead of introducing catheters, and suffering them to remain, we must destroy the stricture, as is practised in simple cases;

* See Note L.

† Vol. I. p. 285.

and when the urine finds before it, and in its natural course, a channel four lines in diameter, it will enter it, and have no further tendency to escape through the irregular and tortuous passage formed by the fistula, the orifice of which forms a considerably acute angle with that through which the urine filtrates.

If the complete destruction of the stricture should not suffice to prevent the urine from passing into the fistula, we must not employ catheters which are to remain in the canal, but draw off the water with one of gum-elastic, as often as the patient feels an inclination to void his urine, as in paralysis of the bladder. If the effect of catheters upon the urethra had been sufficiently attended to, it would have been perceived that their presence in the canal, is the cause of the tardiness with which the fissure heals. Two conditions are necessary to the cicatrization of a wound : 1st. The inflammation seated in it must be inconsiderable. 2d. It must not be covered with too much moisture. In fact, observe a wound that is dressed with irritating topical applications ; it manifests no disposition to heal. Look at another which is uselessly encumbered with cataplasms, or with a thick coat of cerate ; it remains flabby—the granulations are puffy and fungous. In short, notice an issue, which constantly contains a foreign body that irritates it—it remains open. Now, the catheter which remains in the canal, produces the following effects : 1st. It irritates and inflames the urethra, and the wound which exists in one part of it. 2d. It occasions an excessive discharge of mucus, by which the wound is continually bathed, and keeps up in it that superfluous humidity so detrimental to the cure. 3d. The catheter is to a wound in the canal what a pea is to an issue. These three inconveniences are obviated by not suffering the catheter to remain, and the effect desired is obtained, namely, that of

diverting the urine from the fistulous passages, by introducing a catheter every time that the patient wishes to make water. By using the curved gum-elastic catheter, mentioned at page 53, the patient will soon learn to pass the instrument himself.

There are cases, fortunately of rare occurrence, in which the urine, finding a free passage through the fissure in the urethra, ceases to flow through its natural channel. The wound in the anterior part of the canal cicatrizes, and a complete obliteration of the urethra takes place. Various methods have been proposed for the cure of this terrible disorder. Some have recommended the introduction of a trocar into the urethra, to pierce the sack which terminates the anterior part of the canal, and that a catheter should be introduced into the bladder through this new opening. Others propose to pass a catheter into the canal, and, cutting upon it the part which is obliterated, afterwards to thrust the instrument into the bladder. The inconveniences attending these two operations, and the difficulty of performing them, render them almost impracticable. I believe we may effect our purpose more certainly with the armed bougie. In fact, the opening in the stricture does not guide the instrument in its course in most cases ; and if it be true that in a majority of them the caustic follows the proper route, we have a right to conclude that it will proceed equally straight in destroying the sack or partition which divides the anterior from the posterior part of the urethra. As the urine could not carry off the eschars in the case under consideration, it would be necessary, in order to facilitate their expulsion, to throw up injections frequently into the canal. When a communication shall have been re-established between the two extremes of the urethra, it will be proper to employ the means above recommended, to obtain a broad

and uniform cicatrix. It is evident that complete retention could not happen in this case, and if hæmorrhage should take place, it might be easily controlled by introducing an exploring catheter into the urethra; the wax at its extremity would completely fill the bleeding cavity, and prevent the effusion of blood in the same manner as is done by the wax which dentists introduce into the alveoli for the hæmorrhage which sometimes follows the extraction of a tooth. To avoid the risk of leaving a large piece of the nitrate of silver in the urethra, no more should be put on the end of the bougie than will be required for one application. For this purpose a hole may be made in the middle of the extremity of the bougie, in which the piece of nitrate of silver may be placed, and the edges covered with a little of the adhesive substance of which the instrument is partly composed, so as to keep it in its place at the same time that its anterior surface is left perfectly bare.

CHAPTER V.

CASES IN WHICH THE NEW MODE OF TREATMENT HAS BEEN PUT IN PRACTICE.

SECTION I.

Retention of Urine caused by a single Stricture.

Case 1st. Mr. Romain, aged 35 years, had, at the age of 17, a gonorrhœa with chordee and swelling of the testicle. He neglected the disease, and the running did not cease before the end of nine months. Nine years ago he contracted another gonorrhœa with chordee, like the former, also accompanied with swelling of the testicle. From this period he always experienced great smarting on making water, the stream of urine constantly diminished, and four years after the last attack of gonorrhœa he suffered all the tortures attendant on a considerable stricture of the urethra. He made water very often, but very little at a time, and in a very small stream; the urine in passing through the canal caused smarting and exquisite pain, and when the patient had finished making water, he usually voided a quantity of blood. He followed various courses of internal and anti-venereal treatment without success; finally, gum-elastic catheters were resorted to, but the pain the introduction occasioned, and a swelling of the inguinal glands, made him soon abandon the use of them. After this last treatment he at first made water freely, but not without pain, and in the course of four or five months all his sufferings returned

From this time the difficulty of passing the urine was always very great. Mr. R. would rise five or six times in the night to void his water ; he passed but a small quantity at a time, and that only by great and powerful efforts, in the posture of a person at stool. He had a constant mucous running—was seldom free from pains in the loins and hypogastrium, and had frequent paroxysms of fever, with chills and violent head-ache.

Mr. R. was in this state when he came to consult me on the 4th February, 1822 : I passed a middle sized bougie into the canal, and at the distance of five inches I found a stricture two lines in extent ; I took an impression of it ; the opening in the stricture was at its upper third, and not larger than the body of a large pin. (Plate V. fig. 1, in which this impression is correctly represented.) I succeeded without difficulty in making a small cylindrical bougie pass beyond the obstacle ; the next day I passed a larger one covered with moulding wax ; it was suffered to remain some minutes, and when I withdrew it, presented a groove two lines in extent, indicating that this was the length of the stricture.

On the 6th, after having passed a bougie, which I immediately withdrew, I introduced the porte-caustic, and made one application two lines in extent, and which I directed to the lateral and inferior parts of the obstacle. This operation gave but little pain.

I saw the patient on the 9th ; (the fifth day of the treatment ;) since the evening before he had passed his urine in a tolerably sized stream, arched, and as thick as a crow quill. He voided a much greater quantity at once, took much less time in doing it, and remained longer without being pressed by the inclination. I took a second impression—(Plate V. fig. 2.) it presented the same appear-

ance as the first, except that the opening was much larger. I repeated the application of the caustic.

On the 12th, (the eighth day of the treatment,) the stream had increased much since the night before; the patient could evacuate his bladder completely, and had made water but once during the whole of the preceding night; he had spent this night in attendance on one of his children, who was dangerously ill, and he was much fatigued. I therefore thought it not advisable to do any thing.

February 14th I passed with ease a catheter, of the size No. 6, without a stylet into the bladder; I took an impression, (Plate V. fig. 3,) and finding that there were still some projecting points on the lower side, I made a third application, which I directed particularly to these points.

17th--(Thirteenth day of the treatment.) The stream was nearly of the natural size; I again passed the catheter No. 6, which I replaced by a dilator three lines in diameter, which was strongly distended with air, and retained for five minutes.

19th. I introduced a dilator four lines in diameter, which was retained ten minutes; I replaced it by a bellied bougie two lines and a half in diameter; the patient introduced it himself the next day morning and evening.

21st. I passed the same dilator, and replaced it by a bellied bougie three lines in diameter. The patient introduced it himself night and morning, and retained it each time twenty minutes.

24th—(Twentieth day.) I introduced a dilator four lines and a half in diameter, and after it a bellied bougie of three lines and a half, which the patient subsequently passed morning and evening for himself.

27th. The same operation.

29th. I dilated the canal anew, and introduced a bougie four lines in diameter. This bougie, after having passed the external orifice, met with an equal resistance through the whole extent of the canal, which proves that it distended it at all points, and equalled it in diameter. I desired the patient to introduce this bougie every day, and immediately to withdraw it, for eight or ten days; and afterwards to do the same every four or five days for a month, in order that the cicatrix might have time to consolidate without losing any thing in extent.

I presented this patient to Baron Percy, on the third of April, and introduced the bougie of four lines diameter in his presence. The running has ceased from this time, and never since returned. Mr. Romain now enjoys perfect health; he resides at Passy, and in the course of the treatment he came to me to submit to the operations required by his condition, without my ever having been obliged to visit him for that purpose.

Case 2d. M. — aged fifty-four, contracted, at the age of four and twenty, a gonorrhœa which lasted four months, and which was at last subdued only by injections composed of the extract of lead. The running returned at intervals, and even very severely in cold weather. M. — saw the stream of urine constantly diminish, as also the quantity voided at one time; in a little while he could make it only in a very small stream—occasionally it would issue drop by drop, and always with painful and strenuous efforts. At the age of 30 he had a complete retention; a small gum-elastic bougie was introduced into the bladder; a good deal of blood flowed during and after the operation. It was intended to let the instrument remain, but it caused exquisite pain, fever, and swelling of the penis; as these symptoms were not mitigated by baths

the patient abandoned this plan of treatment and withdrew the catheter.

He had recourse to Daran's bougie, which he continued to use night and day for two months. At first he made water freely, but the stream gradually diminished, and in the course of a year the emission of urine was as difficult, painful, and frequent, as it had been before the introduction of the gum-elastic catheter. He had at several times had recourse to bougies; one time he continued the use of them uninterruptedly for six months; but the difficulty of making water always returned. Two years after, he had a hydrocele; it was supposed that the stricture in the urethra might be the cause of this disease, which was treated by injection—the operation was completely successful. The patient underwent various courses of internal treatment to be relieved of his retention of urine; once, among other things, he took the rob of Laffecteur, during the use of which he frequently voided blood by the penis. This happened to him, also, on occasion of the least excess or imprudence. He had a constant discharge of a greenish colour, which would be increased on the slightest deviation from temperance, and in order to suppress it he was directed, without any benefit, for two months, to use *injections of balsam copaiba*. He was subject to paroxysms of fever with chills, and he suffered greatly from hæmorrhoids. Discouraged by so long a course of ineffectual treatment, M. — came to the resolution to try nothing more; he led a very regular, temperate life, carefully avoiding stimulating food or drink and fatigue. For many years he lived in this manner without any thing having occurred of an urgent or serious nature, but always making water with difficulty, little at a time, and often; and always, too, with the greenish discharge above-mentioned. His urine had for several years ex-

haled a strong ammoniacal odour ; it was generally loaded with viscid mucus, which often adhered to the bottom of the receptacle. This matter frequently obstructed the canal, and temporarily aggravated the difficulty of evacuating the bladder.

M. ——— was in this state, when, on the fifth of January, 1822, he committed himself to my care. I perceived a stricture in the urethra at the distance of five inches, and which extended three lines in length. I took an impression of it. (Plate V. fig. 4.) The opening was at the upper third of the stricture, that is to say, there existed in the canal a circular projection, the inferior part of which was twice as thick as the superior. I introduced, without much difficulty, a small gum-elastic bougie, which was retained for an hour—it caused a little irritation, but the stream was enlarged. On the 6th, a bougie covered with moulding wax was introduced, and suffered to remain half an hour. It presented a deep groove two lines in extent ; the urine flowed in the same manner as on the preceding night.

7th. I made a circular application, but with more attention to the inferior part; this operation caused little pain, and the patient made water immediately afterwards.

11th. The stream had sensibly increased. I took an impression ; (Plate V. fig. 5 ;) the projection was less at the lower side—the aperture in the stricture, although much larger than before the application, not being in proportion to the action of the caustic, I thought that the eschar was not entirely detached. I then introduced a bougie, which the patient retained fifteen minutes ; he afterwards made water, and voided three pieces of the eschar.

12th. The stream had visibly augmented from the night

before. I took an impression, (Plate V. fig. 6,) and made a circular application.

14th. (Ninth day of the treatment.) The stream was larger and more arched; a plaster bougie, of the size No. 6, passed without much resistance. Pieces of the eschar came away during the day, and on the 15th, the stream was almost of the natural thickness.

16th. I passed a plaster bougie, No. 6, which I immediately withdrew, and replaced by a dilator three lines in diameter. This dilator was distended, and retained five minutes, and succeeded by a bellied bougie two lines and a half, which was allowed to remain half an hour. On the 17th, the patient introduced the same bougie himself, morning and evening, leaving it half an hour each time.

18th. The urine retained at pleasure, and the stream of the natural size, as in health. A dilator three lines and a half in diameter, was retained for five minutes, and succeeded by a bellied bougie of three lines. On the 19th, the patient passed it in the morning, and kept it in the canal half an hour.

21st. Dilatation of four lines and a half; the dilator was succeeded by a bellied bougie three lines and a half in diameter. The patient repeated its introduction, night and morning, wearing it half an hour.

23d. A dilator four lines and a half was introduced, strongly distended with air, retained five minutes, and succeeded by a bellied bougie. The patient was convinced that the running was much less than it had been at the beginning of the treatment.

The dilator has been introduced every other day, and strongly distended with air and water, until the 1st of February. The patient has passed for himself, night and morning, and worn a bougie four lines in diameter, until this period; he afterwards, for several days introduced,

and then immediately withdrew the bougie every morning at rising.

He now enjoys good health, and his hæmorrhoidal affection has ceased to trouble him, ever since the cure of his retention of urine.

Case 3d. Mr. Devouge, aged forty-nine years, had, at the age of twenty, a gonorrhœa which lasted six weeks, and then left him without any unpleasant consequences. He contracted another at the age of forty, which continued, with severity, for three months. After this the running diminished, but never ceased entirely. Three or four years after this last attack of gonorrhœa, he began to experience pain in making water, and the stream soon became smaller, twisted, and bifurcated. The size of the stream continued to diminish, and, when the patient consulted me, he had, for a year, voided his urine only drop by drop, and with the greatest effort. He never passed more than half a wine-glass of turbid urine, exhaling an ammoniacal odour. The efforts which he made to make water, often caused the expulsion of the fæces, which had for a year past been perfectly liquid. He rose five or six times in the night to evacuate his bladder. He was subject to attacks of fever, with shivering; the paroxysms frequently recurred; he had had three the month preceding the day which introduced me to his acquaintance. At times he lost considerable quantities of blood per anum, without ever experiencing any of the pain attendant upon hæmorrhoids.

This patient consulted me on the 12th November, 1821. I introduced a middle sized bougie, and found a stricture at the distance of five inches two lines from the external orifice; I took an impression of it--the opening, which was very small, was at its inferior side. (Plate V. fig. 7.)

I passed, through a conductor, a small cylindrical bougie, which I replaced by a larger one of a conical shape. The latter was suffered to remain half an hour.

13th—(Second day of the treatment.) I introduced, by means of a conductor, a bougie covered with moulding wax, and withdrew it after a few moments; it bore a groove two lines in extent. I immediately introduced the porte-caustic, and without difficulty made a powerful application, which I directed to the upper side of the stricture.

16th—(Fifth day of the treatment.) The stream had become, since the night before, strong, arched, and as large, at least, as a crow-quill. The patient passed much more urine at a time, without difficulty, and without suffering the pain which had previously attended its evacuation. I took an impression; the opening was three times as large as it had been before the application. I passed, without difficulty, a bougie of the size No. 3, as far as the bladder, and afterwards I made another application, which I also directed upward.

19th—(Eighth day of the treatment.) The stream was almost of the natural size; the patient could retain his urine as well as in health, and had not been obliged to rise the whole of the preceding night. I took an impression; the opening was nearly in the centre. I attempted to pass a gum-elastic bougie of the size No. 6, without a stylet, and as I met with resistance, I made another application. A circumstance worthy of remark, is, that the running had ceased since the night before the last.

22nd—(Eleventh day.) I passed, without resistance, the hollow bougie No. 6, without the stylet; I replaced it by a dilator three lines in diameter, which was distended with air, and withdrawn after five minutes.

24th—(Thirteenth day.) I introduced a dilator four lines in diameter—it was retained ten minutes, and replaced by

a bellied bougie two lines and a half. The patient passed this bougie himself in the evening, and wore it a quarter of an hour.

25th. I passed a bellied bougie of three lines.

26th—(Fifteenth day.) I introduced a dilator of four lines and a half; it was retained five minutes, and replaced by a bellied bougie three lines and a half in diameter.

28th—(Seventeenth day.) I passed the same dilator, which I replaced by a bellied bougie of four lines.

On the 30th November and 2nd December, (nineteenth and twenty-first days of the treatment,) I repeated the same operation. I directed the patient to pass the bougie for two or three minutes every day. I have lately seen this patient; not a vestige of his ancient malady remains. He retains or voids his urine like a man in perfect health. His running has entirely ceased—his urine is no longer turbid—he passes no more blood by the anus, and the fever has never returned from the time of his recovery.

Case 4th. Mr. Finet, aged fifty-five years, had had, in his youth, several very obstinate attacks of gonorrhœa. From the age of forty he had experienced difficulty in making water—pains in the canal—sense of weight and heaviness in the groins and lumbar regions, and a running almost as abundant as that of recent blennorrhœa.* He sometimes made water as often as six times a night, little at a time, in an attenuated, bifurcated stream, and his urine exhaled a strong ammoniacal odour. He had undergone various courses of treatment with bougies. The first, conducted by the late Sabatier, which procured an alleviation that lasted nearly a year; the others facilitated the passage

* See Note M.

of the urine for a few months only, but none arrested the mucous discharge—a pathognomonic sign of the inflammation of the canal. It may with truth be said that it is impossible in these modes of dilatation, to carry the distention as far as is usually effected, on account of a vicious conformation, a kind of hypospadias. The orifice, instead of being situated in the apex of the glans, is placed behind the cornea, and the aperture is not so large or extensible as in the natural state.

On the 17th November, 1821, I introduced a middle sized bougie into the urethra; the instrument was arrested in its progress at the distance of five inches eight lines, by a stricture of extreme sensibility. When I withdrew the bougie, its extremity was covered with viscid mucus. I took an impression, (Plate V. fig. 8,) and found the aperture at the lower part. I endeavoured, by the usual method, to pass a bougie, but I could not succeed. I introduced one by means of a conductor, having an eminence at its extremity. (Plate II. figs. 5 & 10.) I withdrew this bougie, and passed in a conical one of a little larger size. The next day I introduced, by the same means, a bougie covered with moulding wax. It was withdrawn with a groove a line and a half in extent. I then introduced a porte-caustic into the canal, and made an application to the extent of a line and a half, which I directed to the upper part of the obstacle.

21st. (Fourth day of the treatment.) The stream was as large as a duck's quill, and the patient made water without difficulty or pain. He had on the preceding evening passed several pieces of the eschar, of which one was a line in breadth. I introduced without difficulty a bougie of the size No. 2, into the bladder. I took an impression. There was still a considerable projection at the upper part; I directed the porte-caustic towards it.

24th. (Seventh day.) The urine flowed in a stream of the natural size, but scattering and bifurcated. I took an impression; the projection was not greater at the upper than at the lower part. I introduced a cylindrical bougie of the size No. 6; it passed the obstacle, but was compressed by it. I accordingly made a circular application.

27th. (Tenth day.) Stream of the natural size. I introduced with ease a bougie No. 6, which I replaced by a dilator three lines in diameter, which was distended with air, and retained five minutes.

28th. I passed the same dilator and a bellied bougie two lines and a half in diameter, which was tightly squeezed in passing the external orifice of the urethra. The patient himself passed this bougie again the next day.

30th. (Thirteenth day.) I introduced a dilator four lines in diameter, which was succeeded by a bellied bougie three lines in diameter, but the latter passed the orifice of the urethra with considerable difficulty, and caused much pain.

December 1st. I passed the dilator of four lines and a half. It was retained for ten minutes without pain. I re-applied the bougie of three lines.

3rd. I attempted, after having passed the same dilator, to introduce a bellied bougie of three lines and a half, but the hardness and inflexibility of the orifice of the urethra rendered it impracticable. I again passed that used the preceding evening, and to supply the place of the large bougie, I dilated the canal every day for twelve days, and every other day for twenty.

Mr Finet has, since this treatment, enjoyed good health, and passes water in a full stream; is no longer compelled to rise in the night for this purpose; and retains his urine as long as the most healthy person. His running has entirely ceased. In order to satisfy myself as to the state of

his canal, I introduced, two days ago, a bellied bougie of three lines. It met with no resistance, except at the external orifice of the urethra.

Case 5th. Mr. Vitu, aged thirty years, had one attack of gonorrhœa at the age of 17, a second when he was 26 years old, and a third when he had reached the age of 28. The last was attended with chordee, and the running did not sensibly diminish before eighteen months, but it never ceased entirely. In 1814, three years after the last gonorrhœa, he perceived that he passed water in a much smaller stream than formerly, and that it took him much longer to evacuate his bladder. The stream constantly diminished, and the difficulty of voiding his urine increased, gradually, for several years before he would submit to the treatment with catheters or bougies, which was represented to him as the only means of curing his disorder. At length he was seized, two years ago, with complete retention, which went off spontaneously, but which frightened him a good deal, and induced him to undergo the treatment with catheters. He wore one, night and day, for two months; the largest introduced was only an 8, doubtless because the external orifice, which is very narrow, would not admit one of greater size.

After this course of treatment he made water easily for ten months, during which time, however, he had a constant discharge from the penis. After this period, the stream again decreased, and Mr. Vitu was in a short time seized with complete retention. By the use of emollients and the warm bath, the course of the urine was restored. From this time he always made water with more or less difficulty, and found himself occasionally incapable of voiding a single drop for several hours together.

At the time that he came to consult me, the 18th March, 1822, he passed little water at once, but frequently, and with extreme pain, and would rise five or six times in the night to satisfy this want. In the mean while he led a very regular and sober life; his usual beverage consisting of a decoction of flax-seed, dog-grass,* and liquorice; carefully avoiding all errors in regimen, which occasioned complete retention; and he had abstained from sexual intercourse for a year, because he could never attempt it without an increase of pain, and without suffering a very copious discharge, sometimes inducing him to believe that he had contracted another gonorrhœa. He complained particularly of a severe itching along the canal, and he remarked to me that he had a tumour, as large as a filbert, at the perineum, near the anus. "This tumour," said he to me, "becomes very painful and much enlarged when my retention is about to be complete. It has increased since yesterday, and if you do not apply some remedy, I shall have complete retention in a couple of days."

I introduced into the canal a bougie of the sixth size. It stopped at the distance of four inches seven lines. I took an impression of the stricture, the aperture of which was very small, and situated at the upper part. (Pl. V. fig. 9.) I had no difficulty in passing a very fine bougie, covered with moulding wax, into the bladder. I suffered it to remain ten minutes, and when I withdrew it, I found on it a groove of a line and a half. I introduced the porte-caustic, and made an application to this extent, which I directed particularly upward.

The patient returned the second day afterwards; he had passed his water with much more ease on the 18th, at

* There are two different plants by this name; the *Triticum Repens* and the *Panicum Dactylum*. Their operation is simply demulcent. T.

night, and on the 19th; but for some hours past he had been tormented by great micturition, and could not obey the impulse without much pain, and in a thread-like interrupted stream. Thinking this might be owing to the eschar obstructing the aperture in the stricture, I introduced a bougie of the third size, which passed without difficulty. I desired the patient to endeavour to void his urine. I withdrew the bougie, and the liquid issued with force in a stream as large as a crow-quill. The patient passed more than a pint of urine, in which several eschars were to be observed.

The urine continued to flow freely, and the next day the stream was still fuller; the bladder was completely evacuated, and the patient made water no oftener than is usual in health. Of this, the following circumstance, which he related to me, is a sufficient proof. On the 21st he was present at a meeting of the Chamber of Deputies—took his seat, as usual, at 12 o'clock, and felt no inclination to make water during the whole sitting, which lasted six hours. On the 22d I took the impression represented in Pl. V. fig. 10. I passed a bougie into the bladder, and immediately withdrew it, and made a second application.

25th. The patient perceived that a great improvement had taken place in his condition since the preceding night. He made water, he told me, as if he had never had any retention. I took the impression represented by Pl. V. fig. 11, and passed, without a stylet, or using any force, a catheter of the sixth size. I withdrew and replaced it by a bellied bougie two lines and a half in diameter, which passed with ease. The patient introduced the latter himself, morning and evening, retaining it twenty minutes at a time.

Wishing to ascertain the resistance offered by a stricture that has been properly destroyed by caustic, I re-

solved to try how far I could carry the dilatation, by the use of bellied bougies alone. Accordingly, instead of introducing a dilator, as I should otherwise have done, on the 27th I passed a bellied bougie three lines in diameter, and the stricture made no more opposition to the belly than the external orifice. The patient applied this bougie himself, morning and evening, until the 31st; on this day I passed one three lines and a half, and its belly was more impeded by the external orifice than by the part in which the stricture was seated. April 3d. I passed a bougie a little larger than the preceding, but which was not four lines in diameter. On the 6th I introduced one of that size; the belly met with very considerable resistance in passing the external orifice, but traversed the obstacle with ease. The next day I presented this patient to Baron Percy, whom the Institute had commissioned to make a report of my work; and I introduced, in his presence, the bougie four lines in diameter. The running has entirely ceased, and Mr. Vitu retains no symptom of his disease.

The five cases which have been related, clearly prove the superiority of the new method of cure; a marked amelioration has taken place in every patient after the first application. Not one has been incapacitated from pursuing his usual avocations during the course of the treatment, which has been completed in from twenty to twenty-five days. The following case is interesting, not only from the peculiarities which it presents, but because it was the first in which I employed the porte-caustic and dilator. I tried to restore the passage of the urine by the usual means, and the impossibility of doing so led me to invent the porte-caustic. I persuaded the patient to take notes of his disease, and of the treatment to which I subjected him. My object was to obtain, in this manner

circumstantial details of sufferings which can be adequately described only by those who have experienced them. But, instead of merely taking notes, the patient has drawn up a truly luminous narrative of what he endured before and during the treatment,—and I publish his statement unaltered.

Case 6th. I am thirty-four years of age. Between my nineteenth and twenty-fourth years, I had several attacks of gonorrhœa, which yielded to a plan of treatment in which mercury, administered externally in friction, had been often employed: it was attended with no disagreeable consequences. Being an officer in the marine, I made several voyages to the colonies, the temperature of which appeared to have contributed to my recovery. In 1810, I was sent to Holland, where I performed toilsome duty until 1814. During the interim I had a renewal of the running, and the mercurial treatment was resorted to. But an inflammation of my eyes was often added to my other complaints, and frequently also when they were cured, I would return to the service, without troubling myself about a discharge which I could check with balsam copaiba, turpentine, or the tincture of iron. In 1815 or 1816, I had a slight retention of urine, and I used the bath several times; but from this period I perceived that I made water with more difficulty, or, at least, more slowly. This inconvenience continued to augment, and began to be accompanied with pains similar to those felt in gonorrhœa. I took no pains to combat an indisposition which I believed would be only transient, and gradually became habituated to my disorder. However, in 1818 and 1819, my situation became more distressing—the inclination to make water was very frequent—the pain attending it very great,—and the quantity voided at a time inconsiderable. Twice the right testicle was inflamed, but without

any disagreeable result. I did not yet consider it necessary to consult a physician; I saw nothing in these symptoms but the effects of a suppression of the discharge, for there was always more or less of the appearance of gonorrhœa; and I had recourse to the means which I had seen employed at the Marine Hospital.

In 1820 my disorder increased. I am not able to describe my distress; the difficulty I experienced in making water, and, particularly afterwards, subjected me to great privations. I avoided all places in which it was necessary to remain several hours at a time. I often neglected to satisfy my inclination, in order to save those with whom I was in company the trouble of waiting for me. I sought, in my own resources, for some remedy with which to oppose the evil—I abandoned the use of spirituous liquors, and drank vegetable decoctions. In making water, I perceived that, by stretching or elongating the prepuce, I obtained some relief—I gradually contracted the habit of doing so. I remarked also, that, on making pressure on the canal, a little below the scrotum, I facilitated the evacuation—and accustomed myself to this practice. At length, about the end of September, 1820, one of my testicles swelled again: I attributed this to my having walked a good deal the night before. The pain and inflammation increasing, I applied poultices. Being obliged to attend to my business, I found that the exercise aggravated my disorder, and I was compelled to keep my bed.

Becoming now very uneasy, I requested Mr. Ducamp to visit me in the evening. That very evening he ordered the application of fifteen leeches. I experienced a slight relief, but the testicle continued to enlarge.* Two

* The tumour here mentioned, was not inflammation of the testicle, but an immense abscess, involving the whole perineum and a great part of the scrotum. I have described the formation of these abscesses at page 28 and following.

days after, Mr. Ducamp made an incision, from which a considerable quantity of pus issued, which gave me great ease. It was from this period that I began to perceive the real dangers of my situation, and it was also from this time that I began to hope for a cure of my disorder. The manner in which Mr. Ducamp spoke of my complaint; the curative means which he presented me; the tone of confidence and truth which characterized his conversation; all restored my courage.

After the lapse of a few days, Mr. Ducamp undertook to re-establish the passage through the urethra. He began by introducing very small catheters and bougies, all of which were arrested at a short distance. This operation, at first, caused me very acute pain; but I submitted daily to the introduction of these instruments, which, nevertheless, were always stopped at the same point. Mr. Ducamp introduced, at two different times, a piece of intestine, with which he distended the canal. This operation was pretty painful, and the second time, the irritation that it produced threw me into a fever. I remained quiet for several days, using only the bath, and got better. Again, in about eight days, Mr. Ducamp introduced in the canal a catheter, (the porte-caustic,) of a much greater caliber than the bougie which had before been used: this instrument having reached the stricture, he moved another little catheter inside of the first. I found this operation somewhat painful, but less so than those which had preceded it.

That very evening I thought I perceived a favourable change, but the next day what was my surprise, when the urine, instead of falling vertically as before, issued with force; in short, when I found that I could make water with a facility that I had not experienced for the four last years! This prompt and remarkable change excited in me feelings of joy mingled with astonishment. Desirous

of having such a phenomenon explained, I sought Mr. Ducamp, to communicate to him what had happened. My joy was still increased when I found that what astonished me so much, did not at all surprise Mr. Ducamp, who perceived it to be nothing more than a consequence of the operation of the night before, which had appeared to me very simple.

The third day after, I was touched a second time, and the result was to facilitate still further the passage of the urine. A third operation of the same kind, after three days more, gave me scarcely any pain. The following days the pains diminished a great deal after having made water, but the running continued nearly the same.

October 27th, (1820,) three days after the last touching, Mr. Ducamp, after having explored the canal, introduced a bougie, or catheter, of considerable size, which no longer met with resistance, but passed as far as the bladder. Subsequently the urine continued to flow without my perceiving any difficulty; all my mechanical habits, my sufferings, and distress, were almost forgotten.

On the 30th and 31st October, and the 1st and 2d November, Mr. Ducamp dilated the canal. The operation was not painful, even the first time. On the following days it was performed with greater facility. I have now no other remains of my indisposition, than the recollection of the pains and privations with which it harrassed me. It is ten days since I wrote the foregoing, since which time I have felt no perceptible change; that is to say, I find my health perfectly restored, and the result of the treatment I have undergone has left no wish unsatisfied.

15th, Nov. 1820.

Nineteen months have elapsed since the preceding was written, during which I have suffered no difficulty whatever in passing my urine, and I now make water in as full a stream as if I had never been troubled

with retention of urine. The running ceased entirely a few days after the end of the treatment, and has not since returned. From time to time I introduce a large bougie, which I immediately withdraw, in order to ascertain whether the stricture have any tendency to re-appear. This bougie passes as freely to-day, as it did the first day of my cure.

L***

20th May, 1822.

SECTION II.

Retention of Urine caused by Several Strictures.

Case 7th. Mr. —, aged fifty years, had had, in his youth, several attacks of gonorrhœa, most of them attended with chordee. Since the last he has ever had a slight blennorrhœal discharge. In 1812 he began to feel pain in making water, and he perceived that the stream of urine was much smaller than formerly. In 1816 he experienced all the symptoms of a considerable stricture in the urethra. He consulted a surgeon, who passed into his canal, every three days, a catheter loaded with the nitrate of silver. Finding no relief after the expiration of a month, he left this surgeon, and addressed himself to another of celebrity. The latter introduced, with difficulty, a catheter into the bladder, and sent one of his assistants the next day to continue the treatment. But this assistant, after the most laborious attempts, during and after which the patient voided much blood through the penis, withdrew, without having been able to reach the bladder. He was doubtless conscious that he had made a false passage, for he never returned, although the patient sent for him repeatedly, to consult him about the pain that he had felt in the canal and perineum since the introduction of the catheter.

These pains ceased after a few days. The difficulty of making water continued to increase, and the patient at length laboured under complete retention. He summoned a physician, who prescribed emollient and antiphlogistic applications; these means not sufficing to relieve him, the physician attempted to introduce a bougie; he failed at the first trial, but, by dint of patience and perseverance, he succeeded in passing one through the obstacle, and re-establishing the passage of the urine. The treatment with bougies was continued for two months, and the patient passed his water pretty easily for some time: the symptoms of dysuria then returned.

From this time Mr. — always made water with great difficulty, in a very thin stream, and often drop by drop; the quantity of urine voided at once was small, and he would rise four or five times in the night for this purpose. His water was loaded with mucus, and constantly exhaled a strong ammoniacal odour. He felt pains and itchings along the canal, as if he had had gonorrhœa, and was never without a copious blennorrhœal discharge, pains in the groins, lumbar regions, and upper part of the thighs. From time to time, he had paroxysms of fever with shivering; the power of ejecting the seminal fluid had ceased, and the venereal act was so painful and disagreeable, that he conceived an absolute aversion for that pleasure.

Mr. — was in this state when he requested my attendance on the 8th March, 1822.

I found a stricture at the distance of four inches six lines from the external orifice. I took an impression of it: the opening was extremely small, and situated entirely at the upper part of it. (Plate V. fig. 12.) I succeeded in passing a very fine bougie, by means of a conductor with an eminence. This bougie was replaced by another of a conical form. I repeated the operation the next day,

with a bougie covered with moulding wax, which bore a groove three lines in length. I immediately made an application to this extent, which I directed to the lower part of the obstacle.

11th. The patient made water with more ease, and rejoiced much at the relief he had experienced. I took the impression represented in Plate V. fig. 13, and introduced a bougie of the third size into the canal; it cleared the obstacle which had been touched, and stopped at a second stricture at the depth of four inches three lines. I withdrew the bougie, and made a second application to the first stricture, at the distance of four inches six lines, which I still directed upwards.

14th. The stream was a little fuller; the patient voided more at a time; I took the impression in Plate V. fig. 14, and still finding some parts at the bottom projecting, I made a third application in this direction.

17th. No change had taken place in the stream since the 14th. I took the impression represented in Plate V. fig. 15, and passed a bougie of the sixth size; it passed as far as five inches three lines, but was tightly squeezed in the first stricture. I accordingly made a fourth application circularly.

21st. No change in the size of the stream. The exploring catheter passed through the first stricture, and stopped at the distance of five inches, leaving on it the impression of the stricture at this place. (Plate V. fig. 16.) I introduced, in the usual way, a small bougie into the bladder; I immediately withdrew it, and replaced it by another covered with moulding wax; the latter was removed after ten minutes—it had a groove of a line and a half. I therefore made an application to this extent, and as the projection to be destroyed was situated at the under part, I directed the porte-caustic thither.

24th. A great alteration had taken place in the passage of the urine since the evening before ; it issued in a full arched stream, and as large as a duck's quill. I took another impression, and made a circular application. On the 27th I made another ; the stream was almost of the natural size.

30th. I passed the bougie No. 6 into the bladder, and applied a dilator three lines in diameter.

31st. I again passed this dilator, which I distended strongly with air and water. I afterwards introduced a bellied bougie of two lines and a half, but I could not make it go as far as the bladder. I made a mark on the body of this bougie near the glans, and withdrew it, and found that it had penetrated seven inches, and that it had a deep groove one line long, and seven lines from its extremity ; a satisfactory proof that there was a third stricture at the distance of six inches two or three lines from the external orifice.

April 1st. I took an impression of this stricture, (Plate V. fig. 17,) and as the parts projected equally on all sides of the orifice, I made a circular application to the extent of one line with the porte-caustic. I repeated this operation on the fourth.

7th. I introduced a bellied bougie of two lines and a half into the bladder, and withdrew it a little so as to place the belly on the third stricture. This bougie was retained for twenty minutes.

8th. I passed a dilator of four lines, which was replaced by a bellied bougie of three lines in diameter ; the latter was again applied, and retained twenty minutes, on the ninth.

10th. Repeated the introduction of the dilator, and passed a bellied bougie of three lines and a half. It was

retained twenty minutes, and re-applied the next day and the day after.

13th. I passed the dilator of four lines and a half, and the bellied bougie of four lines. It was suffered to remain ten minutes. I applied it again the following day.

15th, 17th, and 22d. I introduced the dilator of four lines and a half in diameter, and the patient passed the bougie himself daily, wearing it several minutes each time. He continued to apply it afterwards, sometimes without allowing it to remain in the canal.

May 8th. The running had ceased; the patient made water with perfect ease, his urine was limpid and inodorous, and he was able to retain it like a person in full health.

At the time that I commit this sheet to the printer, the health of Mr. — continues, and nothing denotes the probability of a relapse. Mr. — has informed me that his relish for the pleasures of love has returned, that he can now gratify his appetite without inconvenience, as much to his satisfaction as before he was taken ill, and that on such occasions he is quite free from that painful sensation with which he was formerly afflicted.

Case 8th. Mr. —, aged forty three years, had, between the ages of eighteen and thirty, several attacks of gonorrhœa, two of which were attended with chordee. Travelling constantly on business, he paid little or no attention to his disease; his running continued for a great length of time, and was frequently aggravated by the fatigues of a journey, or irregularities in regimen. The discharge from his third gonorrhœa, which he contracted in his thirtieth year, continued abundant for more than six months. He succeeded several times in lessening it by astringent injections, balsam copaiba, and other remedies, but could never stop it entirely. Mr. — now experienced a painful sensation along the canal, and scald-

ing in making water. In this state he contracted a fresh gonorrhœa, exceeding all its predecessors in violence, and during which he passed water with extreme difficulty. This return of the disease was combated by the proper treatment, and mitigated as before, but, though the discharge was diminished in quantity, it never entirely ceased.

Mr. ——— observed the stream of urine constantly decreasing; it passed through all the degrees of diminution and difficulty caused by a stricture in the urethra, and at the age of 35 he passed water with great effort, and in a thread-like stream, often guttatim. He made water very often, four or five times a night, but voided little at once. He had constantly a greenish discharge from the penis, with itching and lancinating pains along the canal. He underwent a treatment with bougies, which lasted three months. The flow of urine was restored, and the discharge ceasing, Mr. ——— enjoyed uninterrupted health for fourteen or fifteen months. At the end of this time the difficulty of making water, with all its concomitant evils, returned.

At the age of 30, Mr. ——— resolved to try another course of treatment. He was told that gum-elastic catheters possessed a marked advantage over bougies. He wore them night and day for six weeks, during the whole of which period he was confined either to his bed or his chamber. He made water freely for nine or ten months, but in the course of a year, his pains returned.

Small bougies were now employed, when the difficulty of voiding urine was very great, but when he omitted the use of them longer than eight days, his water trickled drop by drop. The urine was loaded with mucus, which often obstructed the canal. The blennorrhœal discharge

still continued, and at intervals he experienced paroxysms of fever, with chills and rigors.

On the 23rd December, 1821, Mr. — entrusted himself to my care. I introduced a bougie of the sixth size, which stuck at the distance of three inches and a half from the orifice of the glans. I attempted to take an impression of the stricture, with an exploring catheter of the 7th size, but it was stopped at fourteen lines distance from the orifice, bearing the impression represented in Pl. V. fig. 19. I made an application to this stricture to the extent of two lines, directing the instrument to the upper part. I made a second application, circularly, on the 26th.

29th. The bougie No. 6 stopped at the distance of four lines and a half. An exploring catheter No. 7, reached the same point, and bore the impression represented in Pl. V. fig. 20. I made an application two lines in extent, on the upper part; and on the 2nd January, another one circularly.

The urine continued to be expelled with difficulty, but a small bougie which I introduced and suffered to remain half an hour on the 24th and 28th, diminished the pain of this excretion.

January 3rd, I introduced a bougie No. 3. It stopped at the distance of five inches and two lines; it entered a little way into the stricture situated at this place, but could not pass it. I passed another bougie of less size, covered with moulding wax; it cleared the obstacle, and bore a groove nearly three lines in length.

5th. The exploring catheter reached the distance of five inches two lines, and was withdrawn with the impression represented in Pl. V. fig. 21. I made a circular application.

8th. The patient had voided his urine since the evening before in a stream as large as a duck's quill. The

orifice in the stricture was three times as large as it had been before the application made on the fifth. I passed a plaster bougie without difficulty into the bladder, and made a second circular application.

11th. The patient made water in a strong and curved stream. Nevertheless I could not introduce a bougie of the sixth size, and I made a third application.

14th. The bougie No. 6 passed with ease. The stream was of the natural size. The patient retained his urine as well as if he had never suffered from retention. I introduced a dilator three lines in diameter, and left it in five minutes. The next day I passed the same dilator, and replaced it by a bellied bougie of two lines and a half. This bougie was introduced the next day, night and morning, remaining twenty minutes each time.

17th. I passed a dilator of four lines, which was suffered to remain ten minutes, and succeeded by a bellied bougie of nearly three lines, which was tightly compressed in passing the strictured part at the distance of fourteen lines.

19th. Repeated the dilatation, and attempted to pass a bougie of three lines and a half, but it was stopped at the depth of fourteen lines. Perceiving that the slight coarctation which existed at this point, would prove a source of pain, and prevent the introduction of large bougies for the rest of the treatment, I applied the caustic to it.

21st. I introduced a dilator of four lines and a half, and found no difficulty in passing the bellied bougie of three lines and a half. This bougie was again introduced the next day, and the dilator the day after.

25th. I again used the dilator, which was replaced by a bellied bougie of four lines. The application of this bougie was regularly continued for a fortnight, in which time the dilator was introduced thrice. After this I discontin-

ued my visits to Mr. —, recommending him to pass the bougie once a week for some time. He followed this advice; the discharge ceased entirely before the middle of February, and his urine has never since been loaded with mucus.

From this period, Mr. — has enjoyed perfect health. Being desirous of ascertaining the state of his canal, before committing the history of his case to the press, I introduced a bellied bougie of four lines, which, after passing the orifice of the glans, slipped through the canal, without being squeezed more in one point than in another.

The two last cases, will, I hope, sufficiently illustrate the method to be pursued in those cases where the difficulty in making water is caused by several strictures.* There will be found, in the cases to be related in the following sections, some examples, which, while they elucidate other parts of our subject, will present some new rules for our conduct under those circumstances to the consideration of which these sections are specially devoted.

* See Note N.

SECTION III.

Complete Retention.

Case 9th. Mr. Devier, aged 32, contracted, at the age of 17, a gonorrhœa, which was cured after a treatment of three weeks' duration. In his 29th year he was again seized with a running, which lasted with considerable force for three months, during which he frequently voided blood by the urethra. This gonorrhœa was subdued after a time, but the discharge reappeared at intervals; at one time it was so copious that he should have supposed the disease renewed, if he had exposed himself. From the commencement of this new running, Mr. D. perceived that his urine flowed in a less stream than formerly, that it was twisted and bifurcated, and that it was constantly diminishing. He observed the same decrease in the quantity voided at once.

Mr. D. was in this state when he was suddenly seized with complete retention, in the month of December, 1821. Notwithstanding the most laborious and persevering efforts, he remained six hours without being able to void a single drop of urine. He had recourse to the semicupium, emollient clysters, with vegetable decoctions, containing nitre, and succeeded at length in passing his water, but with great difficulty. He took various medicines, but without any benefit.

He continued to make water with much pain and in a small quantity, until the 19th February. In the morning he voided his urine as usual, but he could not pass a single drop from two o'clock until seven, having, during this pe-

riod, employed the semicupium and clysters ; he voided at last about two table spoonfuls. He passed water several times during the night, but always with great pain and difficulty. At six o'clock in the morning, he made some vain attempts to empty his bladder, and continued them with scarcely a moment's intermission, until 11 o'clock in the forenoon, when I arrived at his house. I took a small bougie and succeeded in passing it into the bladder. The patient complained of extreme pain when the bougie passed the stricture : he soon felt a strong inclination to make water ; I withdrew the instrument and the urine flowed in a small stream, but forcibly and uninterruptedly. The patient passed about two wine glasses of urine, and felt somewhat relieved. I prescribed the bath, injections, emollient drinks, repose, and strict diet. I saw him again in the evening ; he had passed water several times, but always with difficulty. I introduced a very flexible bougie, which was suffered to remain half an hour. From this time the urine flowed more freely. A bougie coated with moulding wax was introduced the next day, and retained half an hour ; when withdrawn it was marked with a groove two lines in extent.

22nd. I discovered a stricture at the distance of four inches from the orifice. I attempted to procure an impression with a catheter of the size No. 9, but it was arrested at the depth of an inch and a half ; having withdrawn this instrument, I took an impression with a catheter of the size No. 7, which was detained a little at the distance of an inch and a half, and also at that of two inches, where there were slight coarctations. The orifice of the stricture being in the centre, I made a circular application to the extent of two lines.

I saw the patient again on the 24th ; he evidently made water with more ease ; there were some fragments of the

eschar in the contents of his urinal. I passed easily and without causing him much pain, a bougie of considerable size, which I immediately withdrew.

25th. The patient made water before me in a strong stream as large as a duck's quill. I took an impression, and finding a very sensible projection remaining at the lower part, I made a slight application in that direction.

28th. The stream of urine almost of the natural size. I passed with ease a catheter No. 6.

March 1st. Dilated the canal with a dilator of three lines, and replaced it by a bougie two lines and a half in diameter.

3d. Applied dilator No. 2, succeeded by a bougie of three lines. The patient himself passed it the next day, night and morning.

5th. Repetition of the above.

8th. The dilator of four lines and a half was introduced, and succeeded by a bougie of three lines and a half. This bougie, on being withdrawn, presented a circular groove. I at first believed this to be the effect of the stricture, which I had cauterized; but on a more attentive examination, I perceived that this groove was situated an inch beyond that part of the bougie which should correspond with the point occupied by the stricture.

10th. I introduced the same dilator, but selected a stronger bougie. On the 12th, I passed a bougie four lines in diameter. On leaving the canal it presented a groove like those which had been used before it.

I dilated the canal twice more, and the patient passed the bellied bougie for several days.

Mr. Devier at present enjoys perfect health, and the bougie of four lines passes with as much ease as it did at the end of the treatment. The coarctation situated at the depth of five inches, which caused the depression on

the bougie, was not sufficiently prominent to admit the application of caustic. It might, however, increase hereafter, and require this remedy.

Case 10th. On the 26th February, 1822, Mr. Labarraque, an apothecary residing in Rue Saint Martin, a man of great benevolence and philanthropy, called on me with a request that I would visit a person labouring under complete retention of urine, for whom he had had repeated applications for medicines at his shop. On my consenting to accompany him, he conducted me to the lodgings of the patient. He was a labourer about fifty years of age. The poor creature had been for twelve hours suffering all the tortures of a complete retention of urine. The bladder, which was as hard as a stone, extended as high as the umbilicus; the abdomen was extremely sensible, the skin hot, and the pulse hard, small, and very frequent. I introduced a small bougie, which was stopped at the distance of five inches from the meatus urinarius, and I could not make it enter the stricture. I withdrew the instrument and took an impression of the obstacle; the opening, which was very small, was situated at the upper part. (See fig. 22.) The impression presents on its lower part a projection formed by a depression in the centre and lower part of the stricture. The bougie had probably been caught in this depression. I introduced a conductor with an eminence at its extremity, (Plate II. fig. 5.) and directed the latter downwards, by which means I passed a cylindrical bougie beyond the obstacle. Having withdrawn this instrument, I introduced a conical bougie; this passed freely as far as its centre, at which point I was compelled to employ force, and give it a rotatory motion to make it enter. This bougie was retained nearly five minutes; at first the patient felt an inclination to make water. I en-

couraged him to use every effort for that purpose, and when he was labouring with all his force, I removed both conductor and bougie, and the urine issued in a small stream. The patient thus voided about a wine-glass full of urine, and felt considerably relieved. I ordered thirty leeches to be applied to the anus and perineum, after which he was to use the hip-bath, take an injection of a decoction of poppy heads, and for his only beverage, water sweetened with sirup of gum arabic.

I saw the patient again the next day ; he had continued to pass his water in a small stream ; he felt much better ; the fever had left him, and his bowels were open. I interrogated him concerning his disease : it had come on after the last of several attacks of gonorrhœa ; he had had a constant running, and from time to time paroxysms of fever ; had passed little water at a time, but very often, and on his attempting to lift any weight his urine would be discharged involuntarily, so that when at work he was obliged to wear something to prevent his clothes from being soaked through. He besought me with great eagerness to give him some remedy that might mitigate his sufferings. I advised him to enter some hospital and undergo a treatment with catheters. He replied that his family depended upon his labour for support, and that it was therefore impossible for him to leave them. I then promised to undertake his cure myself, and desired him to call on me in four or five days, to commence the treatment of his case.

On the 4th March, after having by means of a conductor passed a bougie coated with moulding wax, which was marked with a furrow from a line and a half to two lines in length, I made an application, directed toward the lower part of the stricture.

7th. The patient made water in a strong, arched stream,

as thick as a straw. I took the impression represented in fig. 23, and having passed a small bougie into the bladder, I made a second application circularly.

10th. The stream had increased in size ; the patient evacuated his bladder with ease, and for the last two days he had had no involuntary flow of urine while pursuing his business. I took a third impression, fig. 24, and made a new application, directed toward the lower part of the stricture.

13th. The jet remained the same ; it was about the size of a duck's quill. I took the impression represented by fig. 25, and introduced a bougie of the size No. 6 : it stopped at the distance of six inches two lines, and was not compressed by the stricture which I had destroyed at the distance of five inches. I enlarged the latter with a dilator three lines in diameter.

14th. An exploring catheter, No. 7, passed as far as the second stricture, situated at six inches two lines, and bore the impression represented by fig. 26. I passed a bougie covered with moulding wax ; it was marked with a groove nearly four lines in extent. I measured the stricture with the instrument described at page 112, and represented in Plate III. fig. 1. It passed easily into the bladder. I withdrew it until it came just before the prostate gland, and then pressing the shaft in order to raise the moveable pieces, the instrument was gently drawn back ; it was held by the posterior part of the obstacle, and indicated an extent of three lines and a half. I made a circular application of two lines only. Similar applications were made on the 17th, 20th, 23d, and 26th. A bougie of the sixth size then passed with ease, and the stream was almost of the natural size.

I subsequently employed the dilator and bellied bougie as in the foregoing cases. On the 12th April, the patient

himself passed a bellied bougie of four lines. I directed him to continue the use of it for several days, and I saw no more of him.

SECTION IV.

Retention of Urine caused by a Stricture in the Urethra, with Enlargement of the Prostate Gland, and Catarrh of the Bladder.

Case 11th. Mr. Benoit, fifty years of age, had had in his youth repeated attacks of gonorrhœa, which were several times attended with an emission of blood from the penis. Since the last attack he has experienced a constant blennorrhœal discharge, though inconsiderable in quantity, with scalding and pruritus in the canal. At the age of 35 he found a difficulty in making water, for which he underwent various courses of treatment with bougies and catheters, which procured no more than a temporary alleviation. He had found it impossible for more than two years to introduce a bougie into the bladder. He made water only drop by drop, by dint of great straining, and it not unfrequently happened to him to void his fæces together with his urine. This circumstance obliged him to pass his water only in the sitting posture, as in going to stool, or, when he went abroad, to close the anus with a roll of linen or soft paper. His urine became ropy and ammoniacal, and at intervals he was seized with paroxysms of fever and chills. He had been for several years affected with a large inguinal hernia, which had been caused by the laborious efforts which he had been compelled to make in order to discharge his urine. He never voided

more than the third of a wine-glass full at a time, and his sleep was constantly interrupted by micturition.

On the 22nd September, 1821, I discovered a stricture four inches distant from the meatus urinarius: an impression which I took of it showed the opening to be very narrow, and situated at the lower side. (Plate V. fig. 27.) I succeeded in introducing within it for several lines, a fine bougie, which the patient wore half an hour. The next day I again passed the same bougie, and the day after I made, without much difficulty, an application, which I directed to the upper part of the stricture. After two more applications the exploring catheter reached as far as five inches two lines, and bore the impression represented in Plate V. fig. 28. I made three applications on this stricture, then dilated the canal twice, and the catheter penetrated to the depth of six inches three lines, and returned with the impression in the plate, fig. 29. Thus far there has been very little change in the passage of the urine.

For three days I introduced bougies into this third stricture, and on the fourth I made an application, which I directed to the lower side. A marked change now took place in the discharge of the urine; the liquid, instead of distilling drop by drop, flowed uninterruptedly, but with little force, and like the stream of a glass cutter's wheel. From this time the patient passed his water with less effort, less frequently, and without the involuntary discharge of fecal matter: four applications were made to this third stricture, and the exploring catheter passed down as far as six inches nine lines from the meatus, exhibiting the impression represented by fig. 30. In this impression, we observe on each side of the eminence of wax moulded by the aperture, two rounded tubercles, shaped by two excavations at the strictured part, which were very capable of

receiving the point of the bougie, and preventing its further progress. Of course it was impossible for me to pass this obstacle without a conductor. Before determining to destroy this stricture with caustic, I wished to ascertain its situation with respect to the prostate, as also the state of this gland. Accordingly, I passed a large catheter into the urethra, and my forefinger into the rectum. A little beyond the point of the instrument, I distinctly felt a tumour, about the size of a very small hazel-nut; and about eight or ten lines from this tumour, the prostate, larger than a turkey's egg, but tuberculated and unequal. After this examination, I resolved to destroy the obstacle with caustic; and I made five applications to it before I could succeed in passing beyond it a catheter of the size No. 6. The stream was then almost of the natural size, but it was not strong, and fell vertically on leaving the meatus urinarius. From this period, Mr. B. has been able to remain three or four hours without making water; and instead of six or seven times, he has only voided his urine once or twice a night. He set out for Bordeaux almost immediately after the end of the treatment. I recommended him to pass, from time to time, a large bougie, and immediately withdraw it. I heard of him on the 23d May, 1822, and his health was as good as at the time of his departure from Paris.

This patient, notwithstanding the catarrh of the bladder and the congestion in the prostate, has gained two things, by the treatment: 1. he passes his water with ease; 2. he can remain several hours without any urinary evacuation.

Case 12th. Mr. Bienvenu, aged 66, experienced as early as his 26th year, all the symptoms of a stricture in the urethra; the difficulty in making water continually increasing. He had frequently made use of bougies, but as

he could never pass them into the bladder, he derived from them but small relief. In his fortieth year, his urine began to be turbid, and to bring away quantities of a ropy mucus, which obstructed the canal and rendered the passage of the liquid still more painful. He constantly suffered from a sense of weight and pains in his loins, groin, and at the perineum. The slightest error in regimen, particularly indulgence in spirituous liquors, augmented his distress. He therefore observed the strictest diet, abstained from wine, made a constant use of the hip bath, and when his pains increased, found relief in the application of leeches to the anus.

When he committed himself to my care, he voided his urine only drop by drop, with great effort, and passing not more than a few spoonfuls of a muddy liquid at a time. He made water very frequently, as often as twelve or fifteen times every night. The following is the manner in which he described his case to me in a note.

“ I usually go to bed at ten o'clock, and make water before lying down; in about a quarter of an hour I void it again, but only in a small quantity. I have observed that however often I have passed my water before lying down, I am not the more exempt from the necessity of rising a quarter of an hour afterwards for this purpose.

“ Formerly I did not sleep, usually, longer than two o'clock in the morning, but within the two last years, my sleep, though unsound and interrupted by the pain which attends micturition, has continued until three; at that hour the desire to make water becomes very urgent, and for the two or three remaining hours that I continue in bed, I rise ten or twelve times to void my urine. This period I pass in great distress, struggling at the same time with drowsiness and micturition; so that, upon rising, I am almost as much fatigued as on first retiring for the night.

After rising I pass water, yet frequently, in a short time ; and it appears to me, that when I walk or move about, it facilitates the passage of the urine."

I began the treatment of this patient on the 5th December, 1820 ; I found a stricture five inches two lines from the meatus urinarius, the aperture of which was at the upper part, and I could penetrate it with a bougie only by means of a conductor. Having dilated this stricture a little, I applied caustic to it ; after the third application, a bougie of the size of No. 6, entered as far as six inches from the meatus ; the discharge of urine was somewhat easier. I dilated the part cauterized twice with a dilator four lines in diameter, and the exploring catheter readily passed down to the second stricture, the opening in which was central. Two applications sufficed to destroy this stricture, and the instrument passed down as far as six inches six or seven lines, where there was a third ; the urine flowed much more easily, but not in an arched stream.

The third stricture was touched four times, and destroyed like the preceding. This stricture was much more sensible than the others, and a great quantity of glairy matter and mucus was discharged some hours after the slough of the first application had separated. These two circumstances suggested the following reflections, which I find recorded in my notes : the two first strictures possessed but little sensibility ; the last, a great deal : must not this have been because the first had not to sustain the pressure of the urine, which traversed them in small quantities, while the last, being in immediate contact with this liquid, supported the whole weight and force of it, and thus became more irritated, and consequently more sensible, than the two anterior strictures ? If this view of the subject be correct, may not the insensibility of one stric-

ture be assumed as a proof that there is another beyond it, and vice versa? Since I first made this remark I have often found it verified, though I should not venture to propose it as an established principle. The great quantity of glairy and mucons matter which was expelled immediately after the destruction of the last stricture, proves unequivocally the existence of a collection of this substance in the bladder, as I explained at page 34, and that the stricture performs, if I may be allowed the comparison, the office of a strainer, suffering the urine and thinner mucus to pass, and retaining the rest until it shall have been attenuated by decomposition.

The last stricture being destroyed, I was able easily to introduce a large bougie into the bladder. The presence of this instrument caused irritation at the neck of the bladder, and for two days the patient made water with unusual frequency. After this transient excitement had subsided, I dilated the cauterized parts every other day, in order to obtain a cicatrix of sufficient size. The patient made water freely, but without effort, and in a tolerably full stream, but not curved. He now rose not more than four or five times in the night instead of twelve or fifteen.

I had several times introduced my finger into the rectum, in order to ascertain the state of the prostate. This gland had the size and the figure of a sheep's heart; its surface was not studded with tubercles, as in the preceding case, but on being pressed ever so lightly, it gave pain. My worthy friend and colleague, Mr. Dagoumer, who had very carefully attended the treatment I have just related, thought, with me, that mercurial frictions, on that part of the rectum next to the prostate, might be beneficial. We accordingly directed this part to be

rubbed daily with a drachm of the following ointment :

Axunge, ʒj

Calomel, ʒj.

Incorporate them thoroughly.

The patient at the same time used a weak infusion of uva ursi, and the decorticated root of marsh mallows. This plan was remarkably successful; the patient retained his urine longer, and voided less mucus than before.

It is now eighteen months since Mr. B.'s three strictures were destroyed by my curative method. Wishing to ascertain the state of his canal, I introduced a belled bougie three lines in diameter; it passed with ease into the bladder. This fact is very important, and, at the same time, very satisfactory to myself; for what person could have been more predisposed to a relapse than the subject of this case? In fact, the urine, issuing in a feeble current, distends the canal but slightly, and this natural means of dilatation may be considered as wanting in him. The irritation seated in the prostate and bladder, extends, more or less, to the surrounding parts, and may, by acting on the canal, already predisposed to disease, cause new indurations and new strictures. But here, on the contrary, the canal is smooth and round, and the bougie slips through it with the greatest ease.

The friction of the rectum with the ointment of calomel having evidently proved serviceable to the patient, I recommended him to introduce, by means of a bougie with a belly four lines in diameter, a lump of the ointment, of the size of a pea, into the neck of the bladder: for this purpose I pierced several holes, about half an inch from the end of the bougie; he fills these holes with ointment, and introducing the bougie every evening, wears it for a few minutes, to allow its contents time to dissolve. It is only

five or six days since he began this course, consequently I am ignorant of the result.

Case 13th. Mr. P. aged 67, had, in his youth, several attacks of blennorrhœa; he made water without difficulty, but in a small stream, until his fifty-ninth or sixtieth year. He then experienced pains in the bladder and canal, and his urine became glairy and ammoniacal. He made water frequently—as often as four or five times a night. Mr. P. consulted several physicians; they all told him that he had vesical catarrh, and prescribed a mild regimen. Some insignificant remedies were also directed.

Mr. P. communicated these details to me on the 7th March, 1822; and upon my interrogating him, he also informed me that he had a constant blennorrhœal discharge. This symptom induced me to think that there must be one or more strictures in the urethra. I examined the canal, and found an obstruction five inches three lines from the meatus urinarius. I took an impression of it, represented by fig. 31. After three applications, I passed a catheter, of the size No. 6, into the bladder, without a stylet. The urine was expelled with ease, in a thick stream, slightly arched; and Mr. P. ceased to pass his water oftener than once a night. I commenced the dilatation as in the preceding cases, but I could not pass a belled bougie of two lines and a half diameter into the bladder. I then perceived that there was another stricture, at the distance of six inches from the meatus urinarius. I destroyed this second stricture, and afterwards the dilatation was easily effected.

I advised the patient daily to apply some calomel ointment to the neck of the bladder, by means of a large bougie. The blennorrhœal discharge has ceased. Mr. P. voids his urine only once a night, and frequently only on going to bed and on rising.

The three cases which compose this section, and particularly the last, show that we must never neglect to examine the urethra, in persons affected with vesical catarrh; and if a stricture be found, it must be immediately destroyed; the patient will always be benefited by it.

SECTION V.

Cases of Retention of Urine aggravated by previous Treatment improperly conducted.

Case Fourteenth. Mr. D. aged 47, had, in his twenty-fourth year, a gonorrhœa with chordee, the discharge from which did not entirely cease for six months. At 27 he contracted another gonorrhœa, less violent, but more obstinate than the preceding. The running, though small, would disappear for a few days, and then return again. In his thirty-second or thirty-third year, Mr. D. experienced all the symptoms of a stricture in the urethra. He submitted to a treatment with bougies, and enjoyed good health for more than a year. The difficulty in making water gradually returned, and at the age of thirty-five Mr. D. was obliged again to undergo a course of treatment with bougies, which was attended with the same result as before. He was subsequently treated with catheters; fifteen or eighteen months after which the difficulty in passing his urine returned. At this time Mr. D. without pursuing any regular plan of cure, introduced bougies from time to time, whenever the difficulty in making water became too great. He usually succeeded readily in passing a small plaster bougie into the bladder, but at the beginning of February, 1822, failing in this, he procured some bougies of gum-elastic: these were formed internally of cat-gut,

and were of the size No. 3: they were hard and inflexible. He tried, but with little dexterity, to pass one of these into the bladder, and as the difficulty in making water was very considerable, he repeatedly renewed his attempts, during which a certain quantity of blood issued from the penis. The passage of the urine was not altered. Mr. D. passed his water often, but in very small quantities at a time, and either in a thread-like stream or guttatum.

On the 10th March he came to me for advice: he had again tried to pass the bougie, in the night before, without being able to succeed, and he had discharged some drops of blood from the penis. I discovered a stricture five inches two lines from the meatus urinarius, of which I took an impression, and it appeared evident to me that there was a false passage: this print, faithfully represented by fig. 32, is bifurcated, and clearly demonstrates the existence of two openings. But of these two apertures, how are we to distinguish the right from the wrong one? The patient had opened a false route with a straight inflexible instrument: this instrument must have passed in a straight line, and in the direction of the rectum; besides, the stricture and the unnatural passage were both situated at the beginning of the bend in the canal; and these two circumstances warrant the belief that the inferior opening is that of the false route. But, on the other hand, another circumstance appeared to invalidate this conclusion. The urine issued in a very attenuated stream, or only drop by drop; whilst the opening, which reason suggested to be that of the stricture, was wide enough to let the liquid pass in a current as thick as a crow's quill. The other opening was smaller, but nevertheless large enough to admit the passage of a much fuller jet than that in which he voided his water. I was thence led to conclude that the stricture near the false route was not the only obstacle to

the course of the urine, and that there must be another beyond it.

Having made these reflections, I passed into the urethra a conductor furnished with a prominence, which I directed downwards so as to make the orifice of the instrument correspond with the upper opening *a*: through this conductor, I introduced a fine cylindrical bougie, which entered the bladder.* The patient wore it half an hour; the urine flowed more freely. The next day I in like manner introduced a bougie a little larger; the patient also wore this about half an hour; the urine issued in greater abundance. I now suspended the treatment in order to allow time for the false passage to close and heal. The patient was directed to attend to his diet, and in case any difficulty in making water should return, to apprize me of it without delay, and not to attempt the introduction of a bougie.

On the 28th March I took a new impression: the false passage was no longer observable, and I commenced the radical treatment of the disease. Two applications effected the destruction of the first stricture. The exploring catheter entered as far as six inches, and, on being withdrawn, exhibited the impression represented by fig. 33. This second stricture was touched four times and destroyed. The urine then flowed in a stream of the natural size. With respect to the dilatation, I pursued the same course as in the foregoing cases, and with equal success.

Case 15th. Mr.—aged fifty, was seized, without any known cause, with a discharge from the urethra, and ardor

* If I had erred in my opinion, and the opening into which I directed the bougie had been that of the false route, having failed in my first attempt, I should have turned the prominence of the conductor upwards, so as to cause it to pass into the lower aperture.

urinæ: the physician whom he consulted obstinately persisted, notwithstanding the protestations of the patient, in the opinion, that this running was of venereal origin; and treated it accordingly. This blennorrhœa lasted a long time, it had been combated repeatedly with astringent injections, which frequently appeared to aggravate it. From the time that he was attacked with this complaint, Mr. — has rarely been free from pain in the canal, and after a lapse of several years, he experienced all the symptoms which accompany a stricture in the urethra; he voided little urine at a time, with great effort, acute pain, and in a very fine stream. A small abscess gradually formed at the perineum, which induced the patient, who resides in Lorraine, to come to Paris to undergo a course of treatment. The abscess was opened, and there issued several spoonfuls of pus. The canal was dilated by means of plaster bougies.

Mr. — was relieved for some time; but in the course of eighteen months, he found himself as ill as before. He suffered himself to be treated with caustic, and for six weeks a canula of gum-elastic armed with the nitrate of silver, was introduced into the urethra every other day. The caustic was covered with lard,* under the pretence of thereby defending the coats of the urethra from its action. Nevertheless, the patient suffered during the whole of this treatment a most abundant discharge. The application of the armed canula, greatly facilitated the passage of the urine; the patient made water in a stream almost of the natural thickness, but the surgeon could not pass into his bladder a catheter of the size No. 5, and Mr. — returned home without having enjoyed that satisfaction.

* I shall hereafter communicate my thoughts on this innovation.

He voided his urine with tolerable ease for several months, but towards the end of the tenth or eleventh, the difficulty in making water compelled him to repair once more to Paris for surgical attendance. He again committed himself to the care of the surgeon who had applied the armed canula to him a year before. Being greatly distressed by the restlessness and inquietude which his condition occasioned, Mr. — laid his case before me : he had already submitted to eight or ten applications without any sensible amelioration. This is the patient whom I mentioned at page 45, in explaining the manner of fastening bougies by means of a cundum and gum-elastic ring. In order to prevent his linen from being stained by the discharge, he wore a cundum, secured by a ring of caoutchouc ; when he removed the latter, which slightly compressed the penis, several drops of matter fell upon the floor, and made a stain as large as a two franc piece. The patient had all the symptoms of gonorrhœa. He visited me less with a view to be relieved from his distress, than to express to me the apprehensions which his situation inspired. I made him no offer, I gave no advice ; and a few days after I learned that he had departed but little satisfied with the treatment he had undergone.

In about 20 days I was much surprised at the news of his return, and also at a request that I would pay him a visit. I accordingly called at his house. He informed me, that having endured fourteen or fifteen applications without any appreciable benefit, he had been obliged to return to discharge some of the duties of his office, which were very urgent. When he reached his home, he found the difficulty in making water greater than ever. After he had transacted his business, he had come back to place himself in my hands, but he would be under the necessity of leaving Paris in twenty days.

The next day, January 23d, 1821, I found a stricture five inches from the meatus urinarius, and the exploring catheter bore the curious impression shown in fig. 34. The projection of wax *a*, which was at the upper part, was moulded by the opening in the stricture, and the eminence *b*, *c*, by a false passage partially obliterated, and which had been formed by the armed canula. There are two reasons for this being so : 1. Because a gum-elastic catheter armed at its extremity with caustic, tends to perforate the urethra at the bottom of the curve, as I have demonstrated at page 92. 2. Because the caustic, being dissolved, inclines towards the lower part of the canal, and passes through its coats before the stricture is destroyed, as Home has very satisfactorily proved in the passage cited at page 92.

I passed down to the obstacle a conductor furnished with a considerable eminence, which I turned downwards in such a manner as to raise the opening in the instrument above the false route, in order that its orifice might correspond with the passage of the canal. I succeeded without difficulty in introducing a bougie into the bladder by this means. I withdrew the bougie and conductor, and with the porte-caustic having an eminence, I made an application to the extent of three lines, which I directed downwards. I consumed in this application nearly a grain of the nitrate of silver. I used at this time, as I have already observed, to make much stronger applications than I do at present.

The stream of urine sensibly increased from the very day of the application; part of the slough separated on the 25th, and the jet became strong, arched, and as thick as a crow's quill. On the 26th, I took the impression exhibited by fig. 35. It is evident that the false route has closed, and that the part *a*, representing the entrance to the stricture,

is now on a level with the point *b*, corresponding to the opening in the unnatural passage. The latter was therefore separated from the canal by only a very slender partition, as a single application sufficed to destroy it. I made another application.

28th. The stream had almost acquired its natural size: wishing to take an impression, I pushed the wax too forcibly, and a portion remained in the canal. I did nothing more this day. The wax was expelled.

29th. I made another application.

February 2d. I passed a catheter of the size No. 5 into the bladder. The patient wore it an hour.

3d. A dilator three lines in diameter was introduced, distended, and worn ten minutes.

4th. I repeated this operation, and replaced the dilator by a bougie of the size No. 7. At this period I had no bellied bougie.

5th. I passed a dilator of three lines and a half, which I replaced by the same bougie used the evening before. The patient was directed to wear it only one or two hours, but he fell asleep with it in the canal, where it remained from nine o'clock in the evening to four in the morning. He then removed it to make water. At seven o'clock he wished to void his urine, and could not succeed. He came to me, and I passed a gum-elastic catheter No. 4, without a stylet, into the bladder. The patient took a bath, and passed his water easily the rest of the day. This fact proves that the presence of a bougie, when suffered to remain too long, produces irritation and swelling without any benefit, and which indeed may impede the progress of the cure, as I observed at page 131.

8th. I again dilated the canal, but introduced no bougie.

9th. Passed a dilator of four lines diameter; replaced by a catheter of the size No. 9.

10th. The same operation.

12th. Passed a catheter of the size No. 10.

14th. The patient left Paris, with an injunction to introduce this catheter which passed so easily without a stylet, every day for a fortnight.

Since this period I have heard nothing concerning Mr. —, and I am convinced that his health is completely restored. Will his cure be permanent? Many parts have been destroyed during the two courses of treatment which he underwent with the armed canula: a thick and hard cicatrix followed, which was not long after the first course before it impeded the passage of the urine. I destroyed this cicatrix, and procured in its stead another, more extensive and uniform; but I have not been able to remedy the destruction of parts produced by the two first plans of treatment. At this time I had no bellied bougie; and as the departure of the patient prevented my continuing the use of the dilator long enough to allow the cicatrix to become sufficiently consolidated, it must have contracted, and could scarcely have preserved a diameter equal to that of the catheter. However, I bade the patient continue to pass this instrument at least once a month, and if he take this precaution, his cure will be radical; if he neglect it, he will, in my opinion, suffer a relapse:

Case 16th. The patient who is the subject of the following history, in requesting my attendance, communicated to me the following details relative to his situation; they will exhibit the sufferings he endured before my acquaintance with him:

SIR,

It is about five years that the passage of my urethra has been so much contracted, that I employ ten or a dozen

minutes in making water in an almost imperceptible stream; finally, I became utterly unable to void my urine, when I experienced the most dreadful pain and sufferings. With a great deal of perseverance I succeeded at last, sitting in a hip-bath, in introducing a hollow bougie of the smallest size, and I was relieved; but the baths appeared to increase my disorder; the desire to make water became very frequent, and I could not satisfy it in the least, neither could I introduce the catheter. I had recourse to a plan of treatment with caustic placed in a tube and covered with lard. After 40 or 50 applications which greatly widened the passage, I made water more freely. This caustic burnt my canal throughout its whole extent, so that the skin was affected, which it pushed out externally, forming a passage, like a tooth-pick, through which the urine flowed, at the end of the penis.

The quantity of different diluent drinks that I took, injured my stomach, and contributed not a little, I believe, to increase the difficulty in making water. I then abandoned all local medicines, and betook myself to tonics, which succeeded wonderfully with me, but I could not stop the running. After two years, the strictures returned again. I made water with great difficulty, and I was complaining of it, when one of my friends earnestly advised me to address myself to you, sir, stating the case; and told me that you had cured him perfectly, and without giving him scarcely any pain; and that he has never passed his water with more ease, or in a fuller stream.*

I have the honour to be, &c. &c.

BERCHUT.

18th February, 1822.

* This relates to the treatment of Mr. Finet whose case is related at page 146.

Mr. B. made water in my presence ; the stream was very small, like that of a glass cutter's wheel. He repeated the evacuation very often, but in small quantities at a time. He had a copious discharge, and pains in the canal. I discovered with a bougie No. 6, a stricture at the distance of four inches six lines; the bougie passed this obstacle, and stopped at five inches. I took an impression of the first stricture, with an exploring catheter of the size No. 7. The opening was central ; with some difficulty a fine bougie was introduced, which the patient wore half an hour.

On the 20th I took another impression with an exploring catheter No. 8, having four lines of moulding wax, so that it might at the same time take a print of the first and second strictures. This catheter bore the impression represented by fig. 36. We observe at the upper part of this print, a projection of wax, *a*, less than half a line in breadth, supported by another, *b b*, a line and a half in diameter, under which there is a very considerable eminence, *c c*. The conclusion is, that the canal is strictured from four inches seven lines to five inches; and is only a line and a half in diameter ; and that at the distance of five inches there is a stricture with an opening less than half a line wide. I passed a bougie, loaded with moulding wax, into the canal, and when withdrawn it was distorted and full of irregularities for the space of thirteen or fourteen lines, apparently indicating that the canal beyond five inches was strictured to that extent. I made an application extending two lines only.

24th. The patient made water more freely. I took the impression represented by fig. 37, and made a second application.

27th. The stream was as thick as a crow-quill, but it projected only a little distance from the penis : I took another impression, and made an application.

March 1st. I succeeded in introducing a gum-elastic catheter of the size No. 4 into the bladder; the stricture was measured by means of the instrument represented in Pl. III. fig. 1; and I ascertained that this stricture terminated only at the distance of six inches three lines. I felt reluctant to cauterize the canal to the extent of fifteen or eighteen lines; I was desirous, before determining upon it, to try if I could not enlarge it sufficiently by the dilator and bougies. I accordingly passed the dilator of three lines diameter; it was distended, worn for five minutes, and replaced by a plaster bougie No. 4: this bougie was worn for twenty minutes. The patient experienced throughout the day a greater difficulty in making water, and some pain in the canal; in the evening he again passed the bougie, retaining it twenty minutes. The inclination to make water woke him in the middle of the night, but he could not void a single drop of urine. He introduced a gum-elastic catheter No. 1, and the urine flowed.

I remained inactive for two days, to allow the irritation produced by the last operation to subside.

4th. I again applied the dilator of three lines diameter, and the patient in the evening passed a bougie of the size No. 4, which he wore fifteen minutes. Some hours after, he awoke to make water, but could not; he had recourse to the gum-elastic catheter, and succeeded in introducing it. The next morning he urgently entreated me to continue the destruction of the stricture with caustic, declaring that *bougies were the greatest enemies of his canal.*

Before returning to the use of the caustic, I wished to try if I could not manage to enlarge the canal, by means of the dilator alone. I therefore again applied the dilator of three lines diameter; it was distended as much as possible, and worn twenty minutes.

The next day, I passed a dilator four lines in diameter, which was distended in like manner, and worn half an hour. This operation was repeated two days in succession, without the patient suffering complete retention; but also without any improvement in the evacuation. I attempted to introduce a gum-elastic catheter of the size No. 6, and I could not succeed. I passed a bougie No. 4; the patient introduced it again in the evening, and complete retention was the consequence. I resolved, therefore, to destroy this long stricture by caustic, but by separate applications, each of two lines only.

After five applications, the porte-caustic penetrated five inches six or seven lines: the patient voided his urine in a strong stream, about the thickness of a crow's quill. Previously to any operation, I took an impression of the point to be cauterized; but the print was taken with an exploring catheter No. 5, so as to traverse the stricture situated at four inches seven lines. At this stage of the treatment, I used an exploring catheter No. 7, which bore the impression represented by fig. 38. The stricture above-mentioned had, as we have seen, retained a little wax, which formed a small tuberosity *c c* upon the catheter. Beyond this tuberosity, the catheter *b b* was naked to the extent of ten lines, and was terminated by the print *a* of the point cauterized. This circumstance enabled me afterwards to calculate with great precision the progress that I was making. For this purpose, I placed a little moulding wax upon the shaft of the catheter, near its extremity; the first stricture retained the wax, which formed a tubercle; and the distance between this and the impression of the strictured part, indicated how much the obstacle had been diminished in length.

I made three applications, and the exploring catheter exhibited the print shown by fig. 39. I had advanced two

lines since the last impression. The porte-caustic advanced as far as five inches ten lines. I made two applications, and took the impression at fig. 40. The patient passed water in a stream of the natural size, and the bougie No. 6, passed easily without a stylet. I made two more applications and came to the end of the stricture. I thought to destroy the tuberosity that I had left at four inches seven lines, and afterwards enlarge the canal by means of the dilator and bellied bougie, but my patient was obliged to make a voyage to Brussels. The evening before his departure, I passed a catheter of the size No. 7, without a stylet, into the bladder; he wore it twenty minutes, and afterwards introduced it himself, retaining it for a similar period without any inconvenience. I advised him to pass this catheter every two or three days, and to suffer it to remain from ten to a dozen minutes.

Mr. B. did not return before the end of a month, and during this period he had passed the catheter only once. I could not penetrate the bladder with a catheter No. 6, without a stylet, but with one I accomplished it. I made four applications to the space between the distances five inches ten lines and six inches three lines from the meatus urinarius, after which, I could pass a catheter No. 8, into the bladder. I then employed the dilator for four days, which enabled me to pass into the bladder a plaster bougie of the size No. 10. The patient introduced it, and wore it every evening 20 minutes, without inconvenience. I endeavoured, while continuing the use of the dilator, to pass a bellied bougie three lines in diameter, but the belly part could not go beyond the stricture situated at four inches seven lines. I made three applications to it, and the belly passed on to five inches. I made two at this point, and the belly went down to five inches ten lines. This was the progress that I had made, when this book

came from the press. Two or three applications more will enable the bellied bougie of three lines to pass the strictured point; I shall then cease to apply the caustic, and dilate the canal as much as possible.

In these cases we see the dreadful consequences attending the use of caustic, when unskilfully applied upon a plan radically defective. I remarked at page 95, while on the subject of those long strictures which are met with after a course of treatment with the armed bougie, that it is probable that the persons in whom this distressing malady occurs, had, before the treatment with caustic, several strictures close together, and that the armed bougie, impeded in its progress, had destroyed, more or less extensively, the parietes of the urethra, from the first stricture to the last. But independently of this cause, another may be assigned for the complete destruction of the canal in the case under consideration, from the first stricture to the last: the caustic was covered with lard. The first effect of this substance was to defend the coats of the urethra from the nitrate of silver, but the lard, melting at the same time with the caustic, formed with it an escharotic mixture which diffused itself throughout the canal, and cauterized it to a greater or less extent, as is proved by the enormous cicatrix from the point four inches seven lines to six inches three lines, and also the membraniform productions which the patient voided while under this plan of treatment.

I destroyed the cicatrix which was in the canal, and have restored the latter to nearly its former caliber. I have done all that lay in my power, and what could not have been expected from any of the curative methods now in use.* If the patient employ the necessary precau-

* In fact it is evident that bougies produce no other effect than to irritate the canal, without dilating it, and I do not believe that any

tions, he will always pass his water freely: to assure himself of this, he will be under the necessity of passing a large bellied bougie into the canal, once or twice a month, so as to prevent the contraction of the cicatrix. In process of time this cicatrix will assume the properties of a mucous membrane, and there will be less cause to apprehend a relapse; but if this precaution be omitted, the stricture will return.

advocate for the use of the bougie, or armed canula, could be so blind as to think that such a stricture could have been destroyed by either of these instruments. A false passage would certainly have been made, as happened in a case of this nature, related by Charles Bell, and which he has illustrated by an engraving, showing the disorganization of the parts, in Pl. VII, of his great work. Strictures as extensive as that of Mr. B. are less rare than is supposed: I am now attending a shop-keeper, at the Palais Royal, who has one an inch in length. This stricture has such a tendency to contract, that the patient has been obliged to pass a bougie every other day. This disorder was induced by the forcible introduction of the catheter, and the uninterrupted presence of a catheter in the canal for two months, during which abscesses, but not urinary, formed at the hypogastrium. It was with great difficulty that the catheter could be introduced in this patient. Is it not possible, that the point of the catheter, after having forced an unnatural passage before the obstacle, may have again entered the canal by perforating its coats; and may not the long stricture, now found there, be an artificial channel, situated between the anterior and posterior part of the urethra?

EXPLANATION OF THE PLATES.



PLATE I.

FIGURES 1, 2, and 3, represent sections of the canal with strictures of various forms : *a a*, internal surface of the mucous membrane ; *b b b b*, corpora spongiosa ; *c c*, the stricture ; *d d*, a bougie.

In figure 1, the opening is wholly at the upper part ; the point of the bougie strikes against the centre of the stricture and bends back.

In figure 2, the opening is below ; the end of the bougie strikes as before, and turns round.

In figure 3, the opening is central ; the bougie enters it a little way, but becomes so tightly wedged in it that it cannot advance, and it coils up.

Figures 4, 5, and 6, are designed to show the various indications that are to be fulfilled by the application of caustic. See page 105.

Fig. 7. A pencil of silk, terminating in an expansion designed as a part of the exploring catheter : *a a*, filaments of silk ; *b*, the expansion. Page 106.

Fig. 8. *b*, the canula of gum-elastic eight inches in length, open at both ends : *a a*, filaments of silk. See page 106.

Fig. 9. The same part of the instrument, prepared in a different manner.

PLATE II.

FIGURE 1. The *exploring catheter*: *a a*, canula of gum-elastic, eight inches in length; *b*, moulding wax, retained by the silken filaments, represented in Plate I. figures 7, 8, and 9.

Fig. 2. A bougie coated with moulding wax. Page 108.

Fig. 3. A conductor.

Fig. 4. Stoppers of the conductor. Page 109.

Fig. 5. Another conductor. Page 110.

Fig. 6. The *exploring catheter* applied to a stricture: *a a*, internal surface of the canal; *b b*, the stricture; *c*, the catheter; *d*, the moulding wax; *e e*, a portion of wax which has entered the stricture.

Fig. 7. Result of the operation, exhibiting an impression of the stricture: *c*, the catheter; *d*, the moulding wax; *e e*, a portion of wax moulded by the opening in the stricture.

Fig. 8. A stricture in which a bougie has been introduced, by means of a conductor: *a a*, internal surface of the canal; *b b*, the stricture; *c*, the conductor; *d*, the anterior opening of the conductor; *e e*, a bougie introduced through the conductor. See page 110.

Fig. 9. A bougie. See page 111.

Fig. 10. A stricture in which the opening is not in the axis of the canal, and into which a bougie is introduced by the aid of a conductor. See page 110. *a a*, inner surface of the canal; *b b*, the stricture; *c*, the conductor; *d*, the orifice of the conductor; *e e*, the bougie.

Fig. 11. A bougie. See page 111.

PLATE III.

FIGURE 1. A stricture with an instrument applied to it, so as to measure its length. See page 112. *a a*, the internal surface of the canal; *b b b b*, the stricture; *c*, the conductor; *d*, the orifice of the conductor; *e e*, the moveable

pieces. When this instrument is introduced, these pieces form, with the rest of the instrument, a cylinder having a diameter of half a line. When the instrument is introduced, the moveable pieces *e e* are made to spring asunder by pressing a small stylet; the instrument is then gently withdrawn; the pieces *e e* are retained at the posterior surface of the stricture in such a manner, that the space comprised between these pieces and the extremity *d* of the conductor, indicates the extent of the obstruction; a graduated scale, placed at the other end of the instrument, shows the degree at a glance.

Fig. 2. A tube of gum-elastic eight inches in length.

Fig. 3. A platina sheath eleven inches long.

Fig. 4. Represents the interior of this platina sheath: *a*, one turn of a screw for fastening the sheath in the gum-elastic tube, fig. 2; *b b*, two ridges, between which is a depression in the form of a groove.

Fig. 5. *a a*, gum-elastic bougie; *b b*, a cylinder of platina; *c c*, a little box forming a stopping point; *d d*, a groove to receive the caustic.

Fig. 6. The porte-caustic shut.

Fig. 7. The porte-caustic open: *a a*, a gum-elastic tube; *b*, platina sheath; *c*, cylinder of platina; *f f*, groove filled with caustic.

Fig. 8. A stricture to which the porte-caustic is applied: *a a*, the internal surface of the canal; *b b*, the stricture; *c*, platina sheath; *d d*, cylinder of platina; *e*, the caustic.

Fig. 9. A stricture after the application of the caustic: the indentations represent the sloughs.

Fig. 10. The same after the second application.

Fig. 11. The same after the separation of the slough.

Fig. 12. A stricture with its opening on one side, to which the porte-caustic is applied: *a a*, internal surface of the canal; *b*, the parts which obstruct the passage of the urine, and which are to be destroyed; *c*, the platina sheath; *d d*, cylinder of platina; *e*, the caustic.

Fig. 13. The same stricture after the application of the caustic.

Fig. 14. The same after the second application.

Fig. 15. The same after the detachment of the eschar.

Fig. 16. Capsule attached to the platina sheath.

PLATE IV.

FIGURE 1. A dilator three lines in diameter : *a*, the sack of the dilator ; *b b*, a silver shaft, to which is attached the anterior extremity of the sack ; *d*, a ligature which secures the other end of the sack ; *e e*, a silver tube eight or nine inches in length, ending in a tent, as in fig. 2.

Fig. 2. The second dilator.

Fig. 3. The third dilator.

Fig. 4. The dilator flaccid.

Fig. 5. A fawcet to keep in the liquid when the dilator is distended.

Fig. 6. A syringe for the injection of this liquid.

Fig. 7. A bellied bougie four lines in diameter.

Fig. 8. Another.

PLATE V.

THE forty figures contained in this plate, represent the impressions taken during the treatment of most of those patients whose cases are related in this work.

TRANSLATOR'S NOTES.

NOTE A.

MANY writers have affirmed that certain coarctations of the urethra are the result of spasmodic action. This opinion has been received with all the deference usually inspired by high authority, and the confidence that is due only to established truth. But it originated before that higher branch of Anatomy, which investigates the intimate structure of particular tissues for the elucidation of their vital properties, had any existence, and consequently before peculiar modes of action were referred to peculiar structures only.

In the present state of our knowledge, it is believed that none but *muscular fibre* possesses the property of contracting on the application of stimulus; and as spasm consists in the inordinate and permanent contraction of a muscular part, the existence of such a phenomenon in any organ denotes the agency of that tissue.

Now, the most careful mechanical analysis of the urethra has not enabled anatomists to detect any traces of muscularity. Nor have the experiments of physiologists produced a different result. The inference therefore is obvious, that what has been hitherto attributed to spasmodic constriction of the canal, must have arisen from some other cause.

The resistance to the introduction of the catheter, occasionally met with in irritable urethræ, has been ascribed, with some plausibility to the operation of a cause very different from spasm, though productive of similar effects. These cases of temporary constriction are supposed by a late writer, (M. Felix Despiney, of Paris,) to proceed from injection of the *erectile tissue* of the urethra, which, being spongy and elastic, diminishes the diameter of the canal in proportion to the degree of congestion. The researches of M. Adelon demonstrate that the fibrous membrane which forms the outer coat of this duct possesses no contractility.

If the foregoing hypothesis be correct, the rigidity of the whole penis must be proportionate to the degree of resistance; as it would not be rational to suppose that the erection in question, does not include the *corpora cavernosa*.

NOTE B.

When, for the sake of technical convenience, words are borrowed from a foreign language and incorporated with our vernacular terminology, in order that they should have a fixed and definite signification the derivative should convey the same idea as the primitive.

The changes in language which the progress of society is constantly though imperceptibly effecting, render etymology but an imperfect standard by which to estimate the legitimate import of many phrases. This remark however is applicable to those dialects only, which are now employed in the ordinary business of life. But when men of science avail themselves of the superior flexibility of a *dead language* to promote the advancement of the arts, by giving clearness and force to their expressions, every violation of philological propriety must be reprehensible.

The word *micturition*, which signifies the *desire*, is used in the majority of practical treatises to express the *act* of performing the urinary evacuation. It would undoubtedly be deemed a very gross error in any author who should confound the terms *alvine dejection* and *tenesmus*, or *nausea* and *emesis*. It would be difficult, I apprehend, to convince a patient tormented with *bulimia*, that to be hungry and to eat, were one and the same thing. The nomenclature of modern science, like our commercial metropolis, is over-burthened with useless foreigners. Hence the turgid style of those who extort the admiration of the vulgar by phrases of polysyllabic dignity. Witness the frequent, but unnecessary employment of such terms as *Infarction*, *Pultaceous*, *Inquination*, *Decollation*, &c. &c.

Let the hitherto unsuccessful attempts to attach an uniform and intelligible signification to the word *irritation*, illustrate the necessity of precision in technical phraseology.

NOTE C.

In describing the progressive diminution in the size of the jet, M. Jourdan, in his work on venereal diseases, quotes the following passage from Lallemand's treatise on Dysuria. Speaking of the passage of the urine in drops, he says, "this phenomenon indicates the presence of several strictures, for as M. Lallemand has remarked,—'when there is only one, provided it be not too near the neck of the bladder, the urine is commonly projected to some distance, although the stream be exceedingly fine and bifurcated or twisted. But when there are

several, the liquid falls perpendicularly between the legs of the patient, and if their number be considerable, the retention will be complete. It is easy to conceive that a single stricture with a very small opening, may occasion complete retention; and that when the passage is restored, the urine, meeting with no other obstacle, should be propelled with considerable force, though in a very slender jet. But in traversing several strictures in which the openings are not very narrow, the urine loses its impulse by a succession of impediments, and always drops vertically.

NOTE D.

This affords a striking proof that intermission in the course of a febrile affection, does not necessarily imply any peculiarity in its essential nature. When physiology shall have attained means to develop the functions exercised by the spleen, pancreas, and lymphatic glands, it may be discovered that *all* cases of intermittent fever are symptomatic of irritation as purely local as that which causes a stricture of the urethra. Neither the efficacy of bark and other tonics, nor the apyrexial intervals, can invalidate its claim to a place among the local phlegmasiæ; and the fact quoted from Sir Everard Home, shows the necessity of examining the state of *particular* organs, in all cases of what is called *constitutional* irritation.

NOTE E.

Although this work is devoted exclusively to those cases of retention which are caused by stricture, as the author has extended his description of the primary affection to the consequences and complications with which it may be attended, the introduction of the following fact will not be judged inapposite.

The causes of retention usually noticed are paralysis of the bladder, or stricture of the urethra; but a case is related in the 134th No. of the *JOURNAL UNIVERSEL DES SCIENCES MEDICALES*, in which the evacuation of the bladder was prevented by the effects of chronic catarrh. The retention was marked by all the symptoms which ordinarily characterize the presence of stricture. The temporary obstruction adverted to by Ducamp as caused by the accumulation of mucus, was owing to the *stoppage of the orifice of a stricture*. But here the urethra retained its usual dimensions throughout.

Case. "M. R. a magistrate from the provinces, 73 years of age, addressed himself to me, complaining of great difficulty in making water. *He had never had gonorrhœa, nor any other form of the venereal disease.* For several months he had perceived that the stream of water constantly diminished in size, and at the time when he consulted me it passed guttatum, and by very great efforts only.

"On the 30th September, 1824, a bougie was introduced of the size No. 6. It reached the depth of five inches and a half. An exploring catheter was passed down to the obstacle; when withdrawn, the wax was covered with a quantity of thick and viscid mucus. The second impression was club-shaped, without the cylindrical projection which should indicate the orifice: introduction of the smallest bougies; they do not penetrate further than $5\frac{1}{2}$ inches.

"Surprised at the form of the impression, and at not finding any indication of the orifice of a stricture, I again had recourse to the exploring catheter. The same result as before—impression still rounded and rough—slight fissures running irregularly on the surface of the wax at its extremity—more mucus brought away adhering to it.

"A catheter is introduced as far as the obstacle, and suffered to remain there for three days; the patient removing and immediately afterwards replacing it when he wishes to make water.

"24th. A second examination. A catheter No. 6 penetrates seven inches—second impression—still rounded and irregular, without the slightest projection to mark an orifice—wax loaded with very thick concrecent mucus. Introduction of extremely fine bougies; they do not pass beyond this point, even when pressed with force—patient complains of no pain from the use of them.

A catheter No. 4 introduced as far as the obstacle, and left in the canal three days. At the end of this period, it is pushed on again, and enters the bladder. The stream of urine increases in size and force. This catheter is succeeded by another, (No. 6,) passed as far as the bladder, and allowed to remain two days. This, succeeded by one of the ninth size, which also enters.

Introduction of the catheter, morning and evening, for several days—brings away large quantities of mucus, having less consistence, however, than at first. Finally, the passage becomes clear, and instruments pass with ease; the urine deposits a thick muco-purulent sediment."

It is highly probable that the advanced age of the patient contributed indirectly to the obstruction of the canal, by diminishing the expulsive power of the bladder, so that the stream of urine did not issue with sufficient force to carry off the matter as it was effused.

The diagnosis, in such cases, can be derived only from the appearance of the wax on the exploring catheter, by which the nature of the affection cannot fail to be distinguished;—an additional proof of the efficacy of M. Ducamp's plan of treatment, which enables the practitioner to determine with precision the internal condition of the parts.

NOTE F.

Many valuable truths have been hastily rejected, in consequence of the errors which arise from their misapplication. The Lithonriptor of M. Civiale, which first brought into notice the use of straight inflexible catheters, has been generally deemed inadequate to accomplish the purpose for which it was designed. The merits and defects of this instrument have been ably discussed by Dr. Jamieson, of Baltimore, in the 8th vol. of the Medical Recorder, where, speaking of its application, he observes:—"But it is unnecessary to appeal to facts; common reflection teaches the surgeon who is familiar with the use of the sound, that the urethra in the living subject, surrounded by sphincter muscles, a crooked canal, and a surface acutely sensible, can never give passage to the lithonriptor without considerable pain."

This remark applies exclusively to the form of the instrument; for with respect to its size, relation exists between it and the canal in stricture, where the passage is extremely narrow and the sound proportionably small, as in the lithonriptor; where the unobstructed urethra is distended by a bougie having a diameter greater than the natural width of the passage. But because the introduction of a straight instrument *into the bladder*, is impracticable with the inconveniences above enumerated, it does not therefore follow, that one of that construction can *never* be usefully employed in the treatment of dysuria. To oppose such a conclusion, there is the testimony of M. M. Annessal,* Jourdan, and Lallemand. The second of these gentlemen expresses himself on the subject to this effect. "I would remark, nevertheless, that it is not a matter of indifference whether a straight or curved catheter be used; and that the depth at which the stricture is seated,

* This distinguished surgeon is disposed to maintain that the urethra has no curvature: but the appeal to anatomy is too ready and conclusive, to suffer such an opinion to obtain currency, even should the popularity of its author procure it partizans.

should decide the choice to be made between these instruments. The curved catheter is proper only where the obstacle is near the prostate, or when the gland is either wholly or partially enlarged. *The straight catheter should be preferred when the stricture occupies the anterior portion of the urethra.*"

"It is customary," says M. Lallemand, "always to employ a curved catheter for this operation, whereas it is evident that if the coarctation be situated in the straight part of the canal, however small it may be in extent, it cannot be traversed by a curved catheter, in whatever position the penis may be held, unless, indeed, the instrument be so fine as to move freely in the strictured part. In such a case, bougies pass much more readily than common catheters, and should always be employed in preference to them when the indications admit of it."—Jourdan. *Maladies Veneriennes*, IIme. Partie, p. 781 et seq.

NOTE G.

Since the promulgation of M. Ducamp's views on the subject of this treatise, and since the general adoption of his instruments by the profession in France, many useful comments have been published, relative to the soundness of the former, and the practical advantages of the latter.

It has recently been objected to the bulging conductor of the author, "that it cannot be applied beyond the distance of six inches and a half; the catheter tending constantly to straighten itself, and the prominence turning so quickly to the upper part, that it is difficult to hold it down."

In addition to this, it is also urged, that "it is necessary to determine with precision, the degree of projection required in any particular case." With respect to the eminence, as M. Despiney very pertinently observes, the elevation of the projection on the wax will give the measure of the necessary bulge.

"In Ducamp's conductor, the prominence occupies a very small portion of the circumference of the instrument. Now it will be readily conceived that when introduced into the urethra, and resting on a single point of its concavity, this prominence may turn very easily; the rather, that there remains a vacuity between its sides and those of the canal. In order to render the application of this conductor more certain, the protuberance should extend much further, and comprehend at least three-fourths of the circumference. Such a sound, fitting the urethra more closely, and compressed on all sides by its parietes, and, moreover, having a point of support laterally, which the instru-

ment of M. Ducamp is without, would retain any position that might be given it. Care should be taken that the prominence taper imperceptibly to the point of the conductor, so as to have a slightly conical shape, in order that it may traverse the passage more freely. It is equally desirable to have this prominence attached to a sound of such diameter that the whole apparatus may readily penetrate to the seat of the stricture."—*Journal Universel*, No. 134.

NOTE H.

The superiority of M. Ducamp's method, under ordinary circumstances, is generally admitted; but, cases have occasionally occurred, in which cauterization has proved wholly ineffectual. It has been found, that when the stricture was seated near the orifice of the glans, that caustic, applied repeatedly, and in considerable quantities, produced no enlargement of the passage. In these instances, the means subsequently employed to effect the dilatation of the urethra, were equally unavailing.

The reader will require no apology for the relation of the cases in which this interesting fact was first noticed.

Case 1. Stricture at the orifice of the glans—seven cauterizations, and afterwards, applications of dilators and bellied bougies, without any sensible change. A second stricture at the depth of five and a half inches.

M. H ———, wig-maker, aged 63, after several attacks of gonorrhœa, began in 1813, to experience pain and difficulty in making water; at which time he presented himself to me. He had double inguinal hernia, and was incessantly tormented by a vehement desire to evacuate his bladder. The urine was expelled in drops, by laborious efforts, and diffused a strongly ammoniacal odour. A viscid puruloid discharge flowed from the penis. He had undergone several courses of treatment with catheters.

On the 22d May, 1824, the urethra was explored. A stricture was found at the orifice of the glans;—first impression;—prominence on the wax nearly a line in diameter. A bougie No. 3 entered with difficulty. Cautious introduction of a bougie No. 1, to ascertain whether any other obstacle impeded the passage to the bladder. The bougie traversed the first stricture freely, but stopped at the depth of five inches and a half; beyond which it could not penetrate, although repeated attempts were made for that purpose. Very acute pain through the whole of that part of the canal traversed by the instrument;—mu-

cous membrane of the urethra inflamed and rugous. The patient was terrified at the idea of introducing a bougie; nevertheless he could make water only by passing a very fine bougie from time to time.

The same day, May 22d, the cylinder of Ducamp's porte-caustic introduced like a stylet into the fossa navicularis;—circular cauterization through the whole extent of the first stricture, half an inch in length. Pain very acute;—some hours afterwards severe chills followed by ardent fever—delirium the whole night—prepuce œdematous, red, and swollen, as in phymosis—penis in a state of partial erection—micturition exquisitely painful—violent efforts to expel a few scalding drops. At length, 12 or 15 hours after the cauterization, there came on copious diaphoresis;—abatement of the fever, which however did not cease for several days. Leeches to the perineum, emollient poultices, full bath, semi-cupium, injections, low diet, &c. in order to allay the irritation of the urethra, and subdue the febrile reaction of the system.

I believed that the patient, having become very irritable by the constant sufferings he had endured for several years, would refuse to persevere in a course of treatment, the commencement of which had been so painful. But he assured me that he knew beforehand that he should have a fever, and that he would submit to any thing to get rid of his complaint. I nevertheless deemed it proper to wait a few days, that the irritation produced by the first application of the caustic might entirely cease.

May 28. Another impression. Prominence still one line.—Second cauterization like the preceding;—extreme pain—fever as violent as before, with chills, heat, delirium, and, finally, perspiration. This time the fever did not last so long, and disappeared completely. The next morning the patient was able to attend to his business.

May 31. Third impression—the prominence appears even thinner than before. Third cauterization with the cylinder of a porte-caustic, larger than that of Ducamp's, and made expressly for this case;—pain less severe—slight fever. The caustic had penetrated deeper, and the eschar did not separate until the fourth day.

June 4. Fourth impression;—the canal a little enlarged;—fourth application of the caustic. The whole of the caustic was consumed—pain and fever, about the same as in the last cauterization.

June 8. Fifth impression;—the passage would scarcely admit a bougie of the third size. The glans continued hard and swollen—copious discharge of pus.

Suspecting that this tumefaction, which was a consequence of the irritation constantly kept up in the glans by the caustic, might be the

cause of the slow progress I made in enlarging the canal, I let the patient alone for several days; and, in order to prevent the granulations which arose after such cauterization from attaining such a growth as to obstruct the fossa navicularis, I directed the patient occasionally to pass into the penis a bougie cut off at about two inches from its vesical extremity, and to let it remain as long as possible without producing inflammation. The glans returned to its original dimensions, and the bougie No. 3 entered more easily.

June 16. Application of the whole of the caustic;—pain pretty severe—slight febrile reaction.

19. Separation of the eschar—bougie No. 4 enters with difficulty—application of Ducamp's dilator, morning and evening, for two days, ten or fifteen minutes each time. The canal was evidently enlarged when I first withdrew the dilator, but it speedily resumed its ordinary diameter.

Finally, on the 22d June, the caustic was applied for the seventh time, immediately after using the dilator, in hopes that by canterizing the parts when recently distended the dilatation would be more permanent. On the separation of the eschar, a bougie of the 4th size passed freely.

Thinking that I might surmount the obstacle more effectually by simple dilatation, I employed, in the manner recommended by Ducamp, dilators and bellied bougies, morning and evening, suffering them to remain as long as was safely practicable. The dilator produced a great deal of pain—a feeling of laceration which the patient found almost insupportable. The heat of the canal softened the wax of which the bougies were composed; the granulations sunk into their substance, and they could not be removed without force and drawing blood.

The implements of dilatation, moreover, could not be left long in the canal; the pain which they occasioned excited inflammation and swelling, so that the condition of the urethra was not at all improved by their action.

Here then was a patient in whom seven cauterizations were made at the fossa navicularis, besides the application of several modes of dilatation; and the only result obtained was an enlargement scarcely perceptible, since from a bougie No. 3, a passage was gained only for the next in size larger; and it admits of a question, whether even this slight increase in the diameter of the canal was owing to the cauterization, or to the dilatation. M. Despiney commenced the treatment of the second stricture in this case, with some prospect of effecting a cure; but M. H— was under the necessity of taking a journey, which prevented his further attendance. He had, however, derived considerable bene-

fit from the method which had been adopted in his case, for, by the last accounts which were received from him, the urine passed without difficulty, and the discharge had ceased entirely. Of course, this amelioration can scarcely be expected to be permanent.

The Treatise of Professor Lallemand contains a very remarkable case, analogous to the foregoing. This was a stricture situated in the fossa navicularis, in which five cauterizations effected no change; and it was not until the caustic had been applied ten times, that an exploring catheter of medium size could be passed through the first obstacle.

Case 2. Stricture at the orifice—five cauterizations without benefit—dilatation by various methods, without any perceptible effect—incision of the stricture—instantaneous and permanent dilatation—another stricture at the depth of four inches ten lines.

M. D. 45 years of age, of debilitated constitution, pallid countenance, and spare habit, had had two attacks of gonorrhœa, each of which had lasted upwards of a year. He had also experienced frequent and painful contusions of the perineum during ten years' service in a regiment of cavalry. He had been repeatedly treated with bougies and catheters, but he had never undergone a complete course; for he experienced such agony when a catheter was left in his canal, that he could endure it but for a very short time. He possessed the most exquisite sensibility: reduced almost to despair by his sufferings, he was rash enough to try the remedy of Leroy, which he took in enormous doses, in hopes, as he said, of dissolving the carnosities in his urethra; he did but aggravate the disorder, and he believed his case to be utterly incurable. At length, having heard of Ducamp's method, his hopes revived, and he addressed himself to me. I prevailed upon him to take lodgings for some time in the city.

M. D. passed his water with great difficulty, and in a very thin twisted stream; he was obliged to rise frequently during the night to perform this evacuation. The penis was small, the glans hard and contracted; the mucous membrane, which was very red at the orifice, exhaled a viscid sero-purulent fluid.

The orifice of the glans was half-closed by a dense adventitious membrane, stretched across it like a diaphragm in miniature. This structure could be easily perceived on attempting to pass an instrument, by which the edges of the opening were drawn asunder. The patient remembered perfectly that this conformation was not congenital; he had only remarked it within the last few years. He told me that there had been a small ulcer in that part; thence it appeared to me sufficiently evident, that this false membrane must have been formed by the process of cicatrization at the lips of the orifice, and

subsequently enlarged by the distention caused by the weight of the urine.

However, this thick membranous septum, which was also invested by the mucous coat, had exactly the colour of the glans, with this difference only, that when it was powerfully distended it appeared whitish and fibrous.

On the 7th June, 1825, this membrane was divided with the scissors; it caused very little pain—a few drops of blood followed. I could then easily perceive that at the circumference, where it adhered to the glans, it was much thicker than at the centre, and that it was composed not only of a very delicate mucous coat, but also of a much denser tissue, apparently of a cellulo-fibrous nature.

Immediately after the division, the lips of the little wound were cauterized with the nitrate of silver: on separating these lips, the urethra appeared expanded like a funnel as far down as two lines below the septum, where there was a stricture.

June 8th. First impression of the first stricture; projection on the wax a line and a half in diameter; but flat instead of being cylindrical, like that of most impressions. Length of the stricture, ten lines.

In order to ascertain the state of the canal at a greater depth, a fine bougie was introduced, which, passing freely through the fossa navicularis, stopped at the distance of three inches; but, by giving it a gentle rotatory motion, it was made to penetrate as far as 5 inches 1 or 2 lines. In its passage through the urethra, the bougie occasioned a good deal of pain, as in the preceding case: it also advanced by jerks. It appeared as if it was moving over an ulcerated surface, or one that was interspersed with fungous eminences. In the course of its progress, the patient experienced pains, which were much more acute in some places than in others. I was able to attend particularly to these varieties of sensation, because I sounded very slowly.

June 8th. First impression of the second stricture, at the depth of 3 inches, with an exploring catheter fine enough to traverse the fossa navicularis. Length of the stricture, 5 lines; diameter, one line; opening, central; first cauterization, circularly; very little pain.

11th. Second cauterization with all the caustic contained in the cylinder—pain very slight.

The author proceeds with the treatment of the second and third stricture, over which he gains some advantage; but he says, “the coarctation of the orifice embarrassed us a great deal; the friction of the instruments against this part was exceedingly painful; the compression of the glans by the fingers, which was unavoidable during the introduction of the bougie, was very distressing to the patient.”

June 30th. First cauterization of the first stricture throughout its whole extent.

July 3d. Second impression at the orifice—no change in the size of the projection on the second cauterization.

8th. Third impression—same result. The opening is not in the least enlarged.

12th. Fourth cauterization, with no more success than the former. The passage would not admit a bougie No. 5.

16th. Fifth application of the caustic. No change.

Thus the nitrate of silver was applied five times without enlarging the diameter of the first stricture; and yet the application was made with a large porte-caustic, and the eschars were of considerable size: but, it would appear that the action necessary to their elimination, re-produced the parts in exact proportion to the loss they had sustained in the destruction of their substance.

I repeatedly had recourse to the dilator of Ducamp; it would enlarge the opening for a short time, but the distention thus effected was painful, and soon afterwards the orifice becoming swelled and inflamed, appeared even narrower than before. After this state had subsided, the canal returned to its natural condition.

Finally, I made trial of sponge, cut into little cones; they were easily introduced, and, when suffered to remain, they swelled enough to dilate the canal considerably; but the asperities of its surface penetrated the soft parts, and, when the sponge was removed, it drew blood, and caused great pain.

Although discouraged by the failure of the preceding cauterization, we tried a sixth application, which was performed immediately after the use of the dilator, but with no better success than formerly. The diameter of the glandular portion of the urethra remained the same. At length I resolved to enlarge the first stricture by incision.

Accordingly, on the first of August, I selected a probe-pointed bistoury with a long and narrow blade, which was marked in the back with a file, about eleven lines from the point. [The reader will recollect that the stricture was nine lines in length, and began two lines from the orifice of the urethra.] Thus, in passing the bistoury eleven lines into the urethra, I was certain that the point corresponded with the lower or posterior extremity of the stricture. I passed the bistoury in such a manner, that the back alone passed in contact with the upper side of the canal; the edge was turned downwards, but did not touch the urethra, and at one stroke I divided the stricture through its whole length, at its lower part, so as to avoid the corpora cavernosa.

The blood issued *per saltum*, but in small quantity, and not so as to occasion any uneasiness. The wound was staunched with a little bit

of old linen rolled into a cylinder, and the lips of this incision were immediately cauterized with the nitrate of silver, as much with a view to prevent their adhesion as to arrest the flow of blood.

A catheter of the tenth size was then introduced and passed with the greatest ease. The eschar separated on the 30th. The same day I succeeded in introducing a catheter of the size No. 12; it passed, however, with some difficulty, in consequence of the inflammation and swelling still existing in the glans, and which were the inevitable consequences of the incision and cauterization. When the glans returned to its natural condition, the catheter No. 12 entered without pain or difficulty.

There may be some reason to apprehend, that with the bistoury a deeper incision would be made into the urethra than was necessary, but it appears to me that such an accident might easily be prevented. The hand can calculate very well the degree of resistance which it must overcome, as well as the depth at which its action must cease. I have already three times removed strictures by incision, and I have found that the difficulty of restraining it within proper limits is altogether imaginary. The pain produced by incision is less than that occasioned by cauterization. The promptness with which the stricture is enlarged is very remarkable, particularly when contrasted with the slowness and painfulness of cauterization.

It may be concluded, therefore, that, in order to overcome an obstacle in that part of the urethra called the fossa navicularis, incision is greatly preferable to any other kind of dilatation.

Case 3. M. R——, aged 43, formerly an officer in the army, had had several attacks of gonorrhœa, and chancres on the penis. He has at this time exostoses on both legs. When he addressed himself to me he was obliged to make water almost every minute; the bladder was never completely evacuated; and his greatest efforts could produce only a feeble, slender stream. He began to experience this difficulty in making water in his twentieth year. Having unlimited confidence in Leroy's nostrum, he had used it constantly, and he is even now, exceedingly astonished to find that his disease has resisted a remedy so *powerfully depurative*.

The first stricture was seated in the fossa navicularis, about half an inch long, and yielding passage to a catheter of the third size. I applied the caustic twice without obtaining any enlargement of its diameter.

Calling to mind the results of the two foregoing cases I determined to persevere in this plan no longer, but made an incision extending the

whole length of the stricture, and then cauterized it slightly; three days after, a bougie of the size No. 10, passed without difficulty.

A second stricture five lines in length presented itself, at the depth of two inches and a half. The opening was at the upper part, and nearly equal in size to that of the first. Emboldened by the success of the former incision, I provided myself with a probe-pointed bistoury, having a long and narrow blade, and after having, as before, taken every precaution to make the extremity of the edge correspond to the end of the stricture, I divided it below, through its whole length, and applied the nitrate of silver to its circumference. The effusion of blood was somewhat more copious than from the first incision, but not sufficient to constitute hæmorrhage. It was speedily arrested by canterization. After the separation of the eschar, the bougie No. 10 passed freely.

I might have made the incision deeper, so as immediately to give the canal a diameter of 4 lines, which would have admitted a catheter of the twelfth size;—but the additional increase will easily be effected by dilatation.

There remains, at the depth of six inches, a stricture which I have already cauterized several times, and through which a catheter No. 6 now passes into the bladder. The treatment has been rather protracted, for, the patient residing at the distance of five leagues from the city, and not having it in his power to remain with me, visits me only from time to time, to procure my attendance. As soon as the caustic is applied he returns home, and immediately after the separation of the eschars he passes into the urethra, morning and evening, the largest bougie that will enter, and leaves it there a few minutes. When his passage is clear, he comes back to me and we repeat the operation. He passes his water already in a full and rapid stream, and I expect eventually to effect a complete and permanent cure.

Incision then appears to be an additional resource in the treatment of strictures. It is much to be desired that observation and experience might furnish the means of determining the cases in which it should be preferred to canterization. From the foregoing statements it is demonstrable that in certain cases of stricture in the fossa navicularis, it possesses a decided advantage over the nitrate of silver.

But it is not only in the fossa navicularis that strictures are met with which cannot be removed by the application of caustic. M. Despiney affirms that he has encountered the kind of obstacle above described, as far down as five and six inches. He proposes to treat these also by incision, and believes that the operation can be performed at this depth as safely as at the fossa navicularis. Of course it would require instru-

ments made expressly for the purpose, but the principal object being the same here as in the porte-caustic, namely, to protect those parts of the urethra which are not diseased, it would not appear difficult to construct them so as to accomplish this purpose.

It seems to me, moreover, that in old coarctations which are hard and almost schirrous, caustic may be applied with every assurance of complete success; but that in those which are fleshy, whether it be that they are more recent, or that this characteristic is inseparable from their organization, it frequently fails altogether. The soft parts appear to acquire additional activity under cauterization; they are regenerated in as great abundance as before, and sometimes appear even to increase in quantity.

The author adds, in a note, the manner of distinguishing a schirrous induration from a soft stricture. "The first resists the passage of the instrument, does not bleed, and gives little or no pain notwithstanding the pressure made upon it. The latter has a totally different character, —the bougie pierces it and causes a feeling of laceration and a considerable effusion of blood."

NOTE I.

It appears from the results recorded by practitioners who have employed the instruments of our author, that the porte-caustic described and used by him has not proved so extensively applicable, as was at first anticipated:—a truth which his lamented and untimely decease prevented him from realizing. M. Ducamp was unable with his porte-caustic to touch a stricture that was deeply seated before having destroyed all those which were anterior to it; and that modification of the instrument which he designed for the arch of the pubes has been frequently found to fail.

M. Lallemand attempted to remedy these defects by sounds of platina, both straight and curved, of different dimensions. The porte-caustic of Ducamp was uniformly of the same size. But there still remains a considerable inconvenience, from the unalterable curvature of these platina instruments; it being well known that the flexure of the urethra varies, not only in different subjects, but even at different times in the same individual, according as the bladder may be full or empty. In addition, therefore, to the necessity of having a number of these expensive sounds of every size, another series of similar dimensions would be required, having different curvatures.

The author of the memoir, from which so many valuable observa-

ations have been already extracted, proposes to substitute for the porte-caustic of platina, sounds of gum-elastic. These are to be truncated at one extremity, which is bound by a little hoop of gold or silver, presenting a smooth round surface, and which answers the purpose of keeping the parietes of the tube permanently distended. Thus, porte-caustic bougies of every size may be made of sufficient flexibility to accommodate themselves to the course of the canal, while their fineness enables them to pass through several strictures to that which is most deeply seated.

These may be used either with M. Lallemand's sliding measure, (*coursur*), or the instruments may be marked like those of Ducamp, with the divisions of the foot. This will indicate at a glance the depth to which it has penetrated.

M. Dēspiney closes his suggestions, on this subject, by observing,—“ I have occasion to make use of this porte-caustic every day, and in no instance have I ever known it to fail.”

For the gratification of those who may feel desirous to trace the progress of improvement in the treatment of stricture, the translator has subjoined the description of an instrument invented by M. Lallemand, for the purpose of remedying the imperfections attributed to the porte-caustic of Ducamp.

As the time which has elapsed since the first publication of this treatise, has brought with it so many valuable modifications of the original plan of treatment, it would be injustice to those to whom the American edition of the work is addressed, to withhold any supplementary information on the subject that may since have found its way to this country.

The objections which have been urged against the porte-caustic of Ducamp, are, that it will not admit of the cauterization of an extensive stricture, throughout its whole length;—that it will not admit of the simultaneous cauterization of several strictures;—that the destruction of any one stricture can be carried only to a certain extent, (No. 6,) which is often insufficient;—and, finally, that it cannot be applied with accuracy beyond the arch of the pubes.

To supply these defects M. Lallemand has devised what he calls a *Caustic Catheter*, and which is intended to unite the advantages of Ducamp's and Home's methods.

It consists, first, of a platina tube open at both extremities; second, of a stylet of the same metal seven lines longer than the catheter, closing the vesical extremity by means of an oval button; third, of a nut secured to the other end of the stylet, to prevent it from leaving

the tube, projecting one or two lines in diameter beyond the tube, so as to afford a better hold of the shaft, and moveable towards or from the catheter, according to the extent of cauterization proposed; fourth of a slider furnished with a screw, to indicate the depth to which the instrument penetrates.

The shaft or stylet is charged with the nitrate of silver in the usual manner; it is introduced into the canula, and the slider is fixed at the point exceeding that which indicates the *depth* of the stricture by a space equal to its *length*, which has been previously ascertained. If the canal be constantly wet with urine, from which it is desirable to defend the caustic, the space between the opening in the canula and the bulbous extremity of the stylet, may be closed with sealing wax. The instrument is then oiled and passed in until the slider touches the glans, which shows that the nitrate of silver has entered the stricture. That extremity of the stylet which projects six lines beyond the canula is now held in one hand, while the other draws back the canula as far as the nut, so that the caustic is laid bare. This is turned in any direction by rolling it between the fingers, taking care to leave between the glans and the slider, the same distance that the canula has passed, which denotes the length of the stricture. If in rotating the canula that part which contains the caustic should meet with much resistance from irregularities, it must be applied longest in that direction. After the lapse of a minute, the stylet is drawn back into the canula and the latter is removed. If, after the separation of the eschar, the stricture should admit a catheter of the second size, it should be employed in preference to any other, in order to fill the stricture more completely; continuing in like manner as high as No. 6. As soon as the first stricture will give passage to a bougie of the 3rd or 4th size coated with wax, it is introduced as far as it will penetrate, the penis is put upon the stretch, a mark is made on the instrument with the nail at the orifice of the glans. A bougie No. 2, covered in like manner with wax, is introduced into the second stricture. In a few minutes it exhibits an impression, the shape and extent of which indicate the form and length of the obstacle. The same process as in the former case is repeated, with this difference, that the nut which terminates the stylet is pushed down until there remains between it and the canula a space only equal to the known length of the stricture. The slider is fixed as much higher than the canula as the length of the obstacle may require. When the slider comes in contact with the glans it denotes that the instrument has traversed the whole stricture. It is drawn back as far as the nut, and the nitrate of silver is exposed throughout the length of the obstacle. A space is left between the slider and the glans equal to that described by the canula when drawn back. After

this cauterization of the second stricture, the first may be again touched, and so on if there be several more.

If the obstacle be seated beyond the arch of the pines, instead of a straight tube like the preceding, M. Lallemand used one with a curve. The same rules are observed in its introduction, but it is necessary to have many stylets, some having the caustic on their convexity, others on their concavity, and on either side, so as to be able to cauterize successively, the upper, lower, or lateral parts of the stricture; although half its circumference might be touched by turning the instrument from right to left.

NOTE J.

The rule which our author observed in his practice of never cauterizing a long stricture throughout its whole extent at one time, seems, from subsequent experience, to have arisen from a groundless apprehension. This gradual mode of overcoming the obstacle, protracts the treatment considerably, while the patient continues to labour under the irritation of partial retention, with all its constitutional effects. The long cylindrical eschars of which M. Ducamp speaks, are by no means frequent. They separate most commonly in detached pieces, and for this reason, that the surface being full of irregularities, the caustic is not applied uniformly to every part of it; and even if such large sloughs should obstruct the canal, they might easily be removed by a bougie.

NOTE L.

It sometimes happens, in cases of complete retention, that the finest bougie cannot be introduced into the stricture. It has been proposed, therefore, to substitute for the bougie an instrument similar to the exploring catheter. The experience of some practitioners has shown that the latter will enter a stricture which could not be traversed by a common bougie of much less diameter. The only objection to this projected improvement in the treatment of complete retention, is the danger of leaving a portion of wax in the bladder, which might form the nucleus of a stone. But when the pencil of silk filns which terminates the instrument is well prepared, the wax adheres firmly. This plan is stated to have been repeatedly tried, and this accident has never been known to occur. Moreover, calculi of considerable size

are sometimes brought away by the urine, and a little bit of wax would be much more easily rejected. Some substance soluble in the urine, as gelatine, might also be employed instead of wax.

NOTE M.

The matter discharged from the urethra during inflammation, was thought by the ancients to be corrupted semen. But it might, or might not be the result of impure connection. The one was designated by the term *gonorrhœa virulenta*; the other received the name of *gonorrhœa pura* or *benigna*. Subsequent researches, however, affording no confirmation of this idea, Swediaur came to the conclusion, that it was simply mucus effused in excess from the irritated follicles of the urethra. The affection, when acute, he called *blenorragiæ*, and when chronic, *blenorrhœa*. More recently, M Capuron, perceiving that the appellatives introduced by his predecessors occasioned an erroneous idea of the disease, because the discharge does not properly consist of mucus, which fluid is secreted only in a healthy condition of the parts, suggested the name *venereal catarrh*; which, without involving any theoretical notions, denotes that the principal feature of the malady is a discharge occasioned by sexual intercourse.

But now, when pathologists are divided in opinion as to the existence of a specific venereal virus; and, since it has been proved by experiment, that all the symptoms of gonorrhœa, commonly so called, may be produced by the application of *any* very active stimulus, the word urethritis appears most proper, as indicative simply of an inflammatory affection of the canal, whatever may have been the source from which it originated.

The names gonorrhœa, blenorragiæ, blenorrhœa, &c. are used synonymously, with this difference only—that some are applied to the acute, and others to the chronic state of the disease.

Much time and labour would be saved, if there were no synonyms in science, from the same language.

NOTE N.

When there are more than one stricture in the canal, considerable difficulty is occasionally met with in attacking those ulterior to the first. The portion of the urethra included between two coarctations, is sometimes full of fungous inequalities, and possesses an exquisite

degree of sensibility. This state of the parts has been so altered as to admit the passage of instruments, by subjecting the membrane to a rapid and superficial cauterization. After the separation of the eschars, the contact of a bougie ceases to excite that extreme pain which had before impeded the progress of the treatment. This fact is important, as it enables us to dispense with waiting for constitutional causes to effect a change which the surgeon may produce at will whenever it is desired.

The application of the caustic, in this manner, to the extent of three or four inches, is represented by those who have tried the experiment, to occasion comparatively but slight pain. The advantage proposed by this employment of a powerful remedy is, that it prevents delay in the prosecution of the treatment, and constantly shortens the period of the patient's sufferings.

M. Ducamp mentions but two modes of effecting the dilatation of the urethra. There is another, not undeserving of attention, particularly when we reflect that no art requires so great a variety of resources as that of curing diseases. This method consists in the forcible injection of fluids into the canal. Mr. Sæmmering has sometimes adopted this plan in cases where the stricture was so narrow as not to admit the finest bougie. It is done by injecting olive or poppy oil into the canal, closing the orifice of the glans, and then, by pressure with the fingers, attempting to propel the liquid through the obstacle. This manipulation is to be repeated until a bougie can be introduced.

M. Amussal affirms that this process is preferable to the use of bougies, at the commencement of the dilatation of a stricture; that it is applicable to cases of complete retention; and that it may also be had recourse to, to assist the action of flexible catheters; that is to say, when the stricture has been sufficiently dilated by injections to permit the introduction of a catheter, it will be advantageous to force the liquid between the instrument and the parietes of the urethra.

*Comparative View of the Methods of Dilatation and Cauterization.**

"If the strictures be recent, they may be promptly and radically cured by dilatation. This method, when employed with the precau-

* Lallemand,

tions necessary to prevent the irritation which the introduction of a foreign body into the urethra tends to produce, is, in such cases, preferable to cauterization.

Moreover, what necessity is there for immediately proceeding to destroy tissues which may yet be restored to their original pliability? We should, at least, try those means which do not cause any loss of substance. And, since it is usual to conclude by dilating strictures after they have been enlarged by cauterization, why should not the treatment begin with it when they are wide enough for the purpose?

I believe that whenever a stricture is very short, and will admit a bougie of the sixth size, it ought to be dilated; though this should not be persevered in exclusively, if the treatment become tedious, for then one or two applications of the caustic being sufficient, it would be better to have recourse to them than uselessly to torment the patient. When the stricture is very close, but not long, dilatation may still succeed; but the treatment lasts a considerable time, and the cure is less permanent. A shorter and readier way would be, to proceed at once to cauterization. Aumont maintains that dilatation is ineffectual whenever the stricture exceeds an inch in length. Such cannot be removed by this method. Dilatation would not here produce even a temporary cure, and it could not be employed as a palliative remedy, for the patient would not be able to endure it."

FINIS.

Fig. 1



Fig. 2

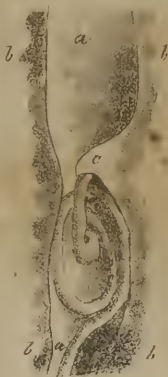


Fig. 3



Fig. 4



Fig. 5

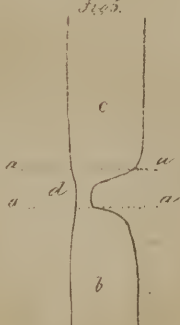


Fig. 6



Fig. 7



Fig. 8



Fig. 9





fig 1.



fig 2.



fig 3.

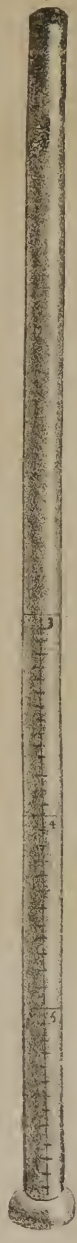


fig 4.

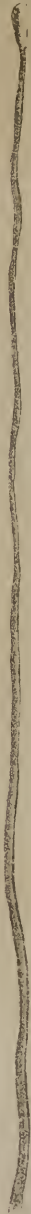


fig 5.

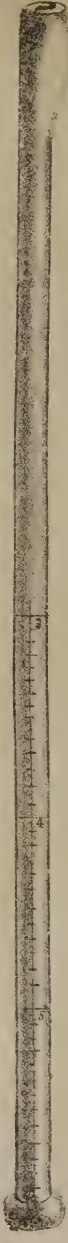


fig 6.



fig 7.



fig 8.



fig 9.



fig 10.



fig. 11.



